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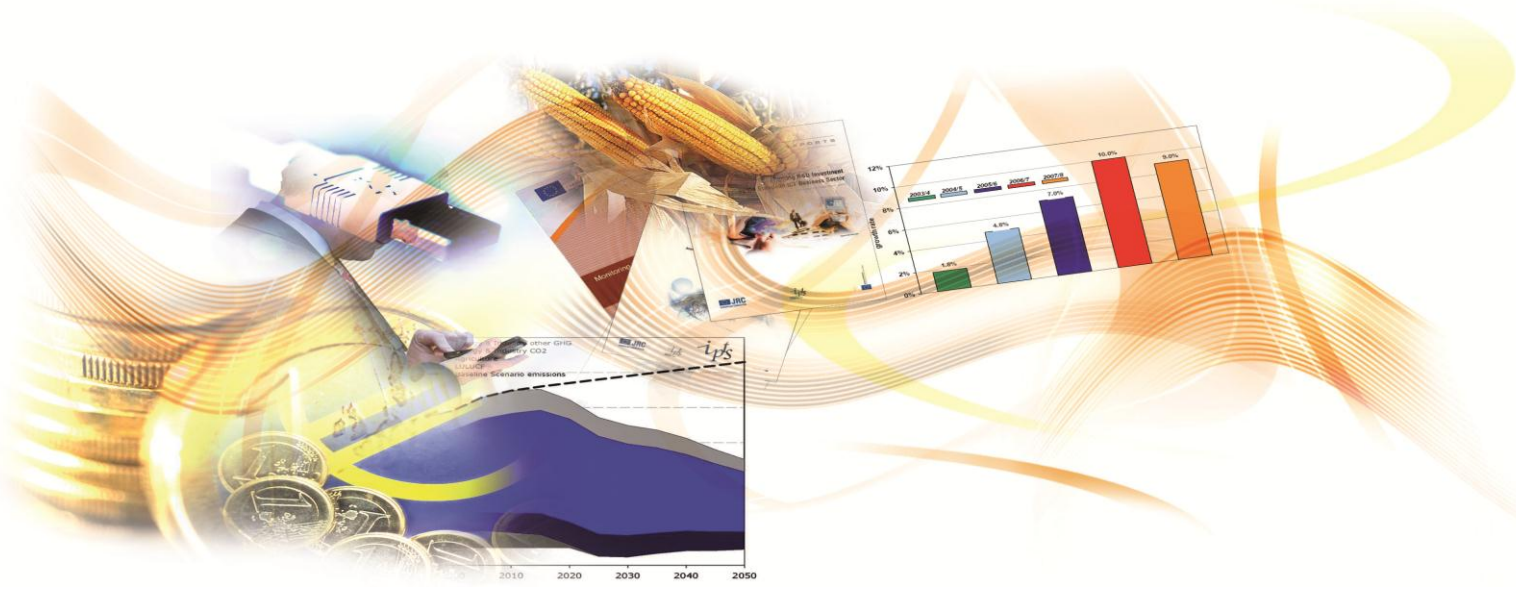

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Abstract

The Analytical Country Reports analyse and assess in a structured manner the evolution of the national policy research and innovation in the perspective of the wider EU strategy and goals, with a particular focus on the performance of the national research and innovation (R&I) system, their broader policy mix and governance. The 2013 edition of the Country Reports highlight national policy and system developments occurring since late 2012 and assess, through dedicated sections:

- national progress in addressing Research and Innovation system challenges;
- national progress in addressing the 5 ERA priorities;
- the progress at Member State level towards achieving the Innovation Union;
- the status and relevant features of Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3);
- as far relevant, country Specific Research and Innovation (R&I) Recommendations.

Detailed annexes in tabular form provide access to country information in a concise and synthetic manner.
The reports were originally produced in December 2013, focusing on policy developments occurring over the preceding twelve months.

ACKNOWLEDGMENTS AND FURTHER INFORMATION

This analytical country report is one of a series of annual ERAWATCH reports produced for EU Member States and Countries Associated to the Seventh Framework Programme for Research of the European Union (FP7). ERAWATCH is a joint initiative of the European Commission's Directorate General for Research and Innovation and Joint Research Centre.

The Country Report 2013 builds on and updates the 2012 edition. The report identifies the structural challenges of the national research and innovation system and assesses the match between the national priorities and the structural challenges, highlighting the latest developments, their dynamics and impact in the overall national context.

The first draft of this report was produced in December 2013 and was focused on developments taking place in the previous twelve months. In particular, it has benefitted from the comments and suggestions of Mariana Chioncel from JRC-IPTS. The contributions and comments from Sergiu Porcescu, Moldovan Office for Science and Technology are also gratefully acknowledged. The report is currently only published in electronic format and is available on the ERAWATCH website. Comments on this report are welcome and should be addressed to jrc-ipts-erawatch-helpdesk@ec.europa.eu.

EXECUTIVE SUMMARY

The Republic of Moldova is a small country in Eastern Europe, with a population of slightly more than 4 millions. The country is split into a main territory controlled by the Moldovan Government and a much smaller autonomous region, Transnistria. Moldova has one of the lowest Gross Domestic Product (GDP) per capita among European countries. In 2012 the GDP, which depends highly on remittances from Moldovans abroad, declined by 0.8%, but its growth is expected to rebound to 5.5%in 2013. GERD has been declining since 2008 and reached in 2012 an amount of €22m, which was as a share of GDP a moderate 0.4%.

The human resources in research-development (R&D) drastically reduced starting 1991, counting about 5,100 in 2012. Many skilled young Moldovans as well as qualified researchers emigrated. Investment in equipment and research infrastructures was disregarded. Nevertheless, international cooperation helped to keep some R&D capacities continuing. As a high share of the young people goes through tertiary education, some potential is available, if the country would offer perspectives to the graduates. The limited available human and financial resources in Moldova have obvious repercussions on the quality and excellence of knowledge production. The number of papers in international databases (e.g., an annual average of 300-350 in SCOPUS) as well as patent applications at EU patent office (about one application annually) is modest. The economic effects of outputs are rather limited due to weak connections between research and business and the economic pattern which based its competitiveness on the cost of resources and not on skills and innovation.

The year 2013 is characterized by intensification of the European integration process of the country, culminating with the start of the Association Agreement with the European Union (EU) and extensive reforms in various areas. Research and innovation (R&I) system and policies were also marked by these processes. Innovation Strategy was approved in November and other strategic documents in research and education are under approval (April 2014). The reforms aim to enhance the contribution of R&I to improve the competitiveness of the national economy and to align R&I structure and policies to European standards.

Academy of Sciences of Moldova have undertaken some actions in the last year as response to criticism of other R&D actors and experts concerning high centralisation of the system (e.g., the creation of funding agency (CFCFA), in order to separate funding from policy and executive functions; the reorganisation of evaluation body (CCE) in attempt to separate the evaluation from other functions). Further changes are provided in the strategic documents (creation of a specialised agency within the Government, creation of innovation branch councils, establish the positions of advisors of the President and Prime Minister on R&I). Overall, R&D policy is still weakly linked with other relevant policies for innovation and the mix of these policies is not yet sufficiently geared towards fostering innovation and strengthening the knowledge base.

The Innovation Strategy of the Republic of Moldova for the period 2013-2020: "*Innovations for competitiveness*", approved in November 2013, foresees five general objectives: 1) Adoption of an open governance model of R&I; 2) Enabling people by entrepreneurship training for innovation skills; 3) Orientation of companies towards innovation; 4) Applying knowledge to solve societal and global problems; and 5) Stimulation of demand for innovative products and services. Another strategy, Strategy of research-development of the Republic of Moldova until 2020, approved in December 2013 (not yet entered into force), identifies five objectives to focus on: capacities, research priorities, linkages, internationalisation, and governance of research. In the 2013 Partnership Agreement between the Academy of Sciences of Moldova (ASM) and the Moldovan Government these policy objectives are complemented with some more refined objectives: strengthening the infrastructure of science and innovation, improving the system of R&D funding, stimulating the creation of innovative small and medium sized enterprises (SMEs), attracting direct investments in science and expanding technology transfer.

The identified structural challenges for Moldova's R&I system include:

- **Lack of human resources for R&D**. The number of Moldovan R&D personnel have decreased drastically due to "brain drain", whereas for the remaining researcher stock a certain ageing trend can be observed. It is difficult to attract and retain young talents. Education offered by local universities does not meet the market expectations, while attracting of foreign students or researchers is difficult due to the unattractive conditions.
- **Low R&D investments, especially by private sector, with no clear prioritisation**. The whole R&D and innovation sector is chronically under-funded and the financial inflow in the sector in absolute figures is quite limited, due to the low GDP. This is due primarily to reduced R&D investment of the business enterprise sector (BES). Moreover, in the modest investments made by the government it is difficult to identify clear, well-defined science and technology (S&T) priorities.
- **Weak links between R&D institutes, universities and BES.** These three sectors are not integrated into an efficient national innovation system and operate in a rather separate manner: R&D institutes produce mainly academic results, universities are oriented on education and the business sector is focused on trading and low-tech products.
- **Inefficient innovation governance model.** The Moldovan innovation governance is highly centralised and has a rather academic character. Innovation policy coordination is generally very weak
- **Undeveloped evaluation and monitoring system of R&I.** The regular and comprehensive evaluation mechanisms for all elements of R&I (system, policies, organisations, programmes, projects etc.) have not yet been established. Another problem is the lack of proper R&D statistics and their comparability with international benchmarks.

The national priorities fixed in the strategic documents in the most part are adequate to tackle the identified structural challenges faced by the innovation system. But some of them have been established recently, others wearing a declarative character or are general, without being translated into concrete actions appropriate and coordinated between them. The sectoral policies in general and innovation components in particular are not well developed, which is a barrier to better tackle the challenges. Furthermore, the existing financing support for actions of R&I policies aiming to address the challenges is rather insignificant.

National progress towards Innovation Union (IU) Commitments is very modest. Partly this is due to the status of Moldova, which does not allow the country to participate in some pan-European activities and contribute to the achievement of common goals. The main barrier for achieving the commitments of the Innovation Union is due to the absence of an efficient national innovation system embedding R&D. From the IU commitments the most important advances at national level seem to be recorded in (20) *Open Access*, (22) *European Knowledge Market for Patents and Licensing*, (27) *Public Sector Innovation* and (31) *Scientific Cooperation with Third Countries*.

The Republic of Moldova has undertaken a series of actions that correspond to the priorities for completion of European Research Area (ERA), but which often are single, unrelated measures. The number and quality of actions for each ERA priority vary significantly, from 2) *Optimal transnational co-operation and competition*, where they feel good progress, up to (4) *Gender equality and gender mainstreaming in research*, for which achieving has not been taken any action (even if the current state is not very badly). The alignment is also difficult to the priority (3) *An open labour market for researchers*, given that the actions taken have failed to improve the attractiveness of conducting scientific research in the Republic of Moldova. In the other two priorities, 1) *More effective national research systems* and 5) *Optimal circulation and transfer of scientific knowledge*, progress is modest and covers only certain aspects. Analysis of undertaken actions suggests a lack of unique vision and a coordinated policy for the implementation of actions towards ERA and IU and a lack of an internal evaluation mechanism of progress.

TABLE OF CONTENTS

1. BASIC CHARACTERISATION OF THE RESEARCH AND INNOVATION SYSTEM

The Republic of Moldova is a small country in Eastern Europe with a population of approximately 4 million. It is split into a main territory controlled by the Moldovan government and the autonomous region Transnistria, which represents 12% of the territory. Moldova has one of the lowest GDP per capita among European countries; however, it experienced strong GDP growth rates of more than 6% in the years 2010-2011. In 2012 GDP declined by 0.8 percent (WB, 2013a), but its growth is expected to rebound to 5.5 percent in 2013.

Gross Domestic Expenditure on R&D (GERD) has been declining since 2008 and according to data of ASM reached in 2012 an amount of Moldovan Lei 351.4 million (€22m), which was as a share of GDP a moderate 0.4% (SCSTD, 2011; 2013). In Transnistria approximately €1.4m (21.2m Transnistrian Roubles) were spent in 2012 by the local administration on R&D, which was equivalent to 0.49% of its budgetary expenditure. For 2013, the Moldovan Government committed in the Partnership Agreement to make budgetary allocations in R&I of 0.34% of GDP.

Moldova's R&D and innovation system is rather centralised, with the Moldovan Academy of Sciences (ASM) being the key player. It is the main policy-making institution and fulfils the role of a ministry of science. The president of ASM is a member of the government. The Moldovan Government approves the Partnership Agreement with ASM, including R&D budget, and the Moldovan Parliament approves laws for R&D and innovation.

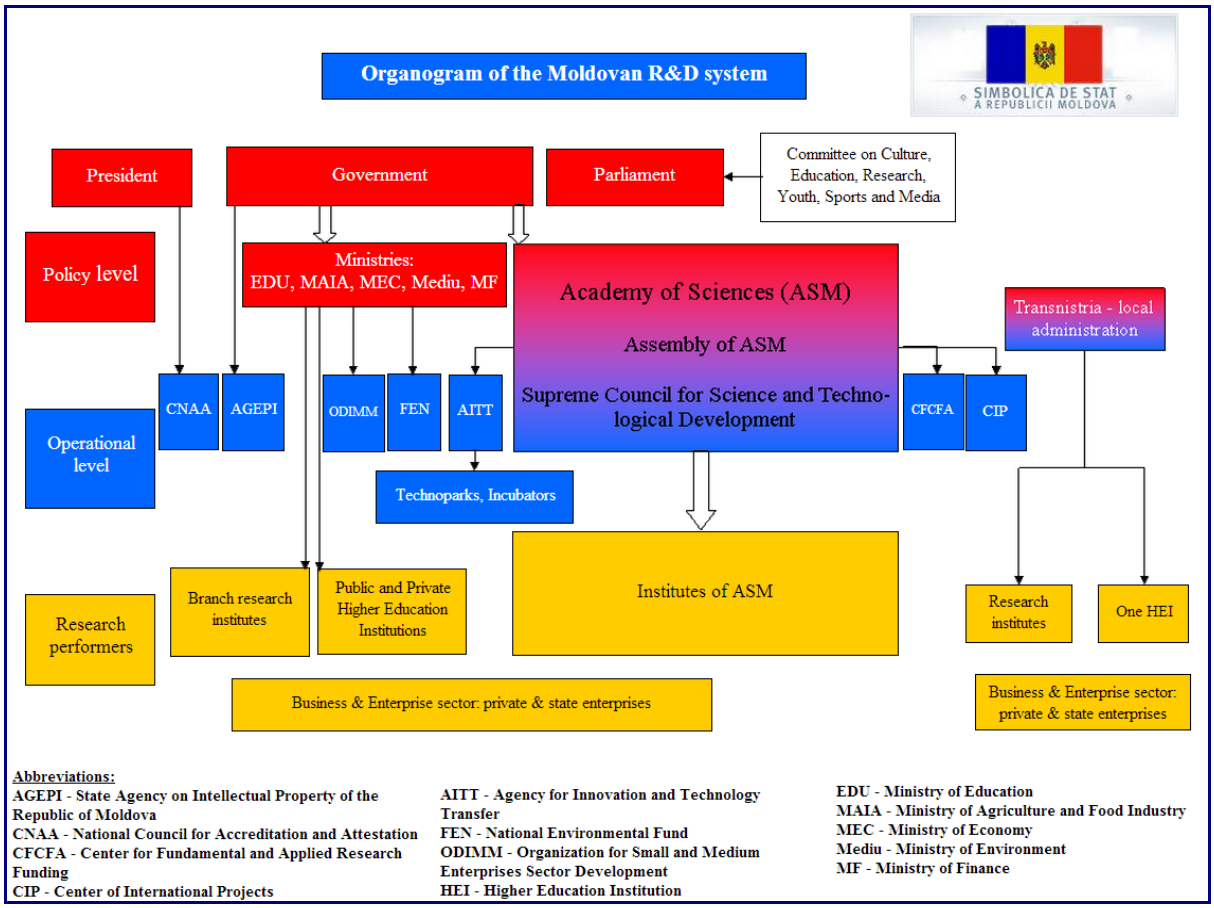
The ASM is also the main policy implementation body; nearly all public R&D and innovation funding programmes are managed by the academy through its executive body, the Supreme Council for Science and Technological Development (SCSTD), and its subordinated management bodies and agencies, the Centre for Fundamental and Applied Research Funding (CFCFA), the Centre for International Projects (CIP) and the Agency for Innovation and Technology Transfer (AITT). The Consultative Council for Expertise (CCE) assures the evaluation for these three funding agencies. The academy is, with its 19 research institutes, also the main research organisation in the country. To the group of public research performers belongs also branch research institutes subordinated to certain ministries.

The 32 higher education institutions (HEIs) in the country are another group of research performers. However, not all of these HEIs are indeed performing R&D. Finally, the business enterprise sector (BES) performs R&D, but only four enterprises are accredited and its activities are not well reflected in statistics. The National Council for Accreditation and Attestation (CNAA) has an important role since it accredits research organisations in Moldova. Only accredited organisations are eligible for public R&D funding. Intellectual property (IP) rights protection is taken care by the State Agency on Intellectual Property of the Republic of Moldova (AGEPI).

Local authorities have some rights in R&D policy. But actually, there is no specific regional approach to the design or implementation of research policy. There are no special bodies at the regional level, which are responsible for R&D development. There is a great difference in the R&D governance and activities between the capital Chisinau, which is inhabited by 21% of the country's population and generates approximately 50% of the GDP, and the rest of the country's territory,

In Transnistria, a Supreme Advisory Council on Science and Technology takes care of R&D strategy formulation and definition of priorities. The head of the local administration subsequently determines the research policy, which is being implemented by the department for education. The regional legislature approves legal acts for R&D. In Transnistria a rather limited

R&D potential is given due to the size of the region. Most R&D is performed in the governmental sector and its HE institution.



The public funding for R&I is established annually and it is fixed in Partnership agreement between Government and ASM. The main funding instrument is so-called Institutional projects, which allocate in a semi-competitive mode more than 70% of public funds. The competitive funding schemes include state R&D programmes, grants for young researchers, grants for procurement of equipment, international projects, innovation and technology transfer projects (ITTPs), grants for editing monographs, grants for organising scientific conferences and PhD fellowships, but its relevance is limited. The rest is allocated through other funding modes (block grants for administration, for facilities, for subordinated agencies to ASM and for infrastructures). The trend in the last years was of increasing the share of institutional funding at the expense of the other funding instruments.

An Innovation Strategy of the Republic of Moldova for the period 2013-2020: "*Innovations for competitiveness*" (Innovation Strategy), developed by the Ministry of Economy, was approved in September 2013 by the Government. It foresees five general objectives: adoption of an open governance model of R&I; enabling people by entrepreneurship training for innovation skills; orientation of companies towards innovation; applying knowledge to solve societal and global problems; stimulation of demand for innovative products and services.

Another Strategy of research-development of the Republic of Moldova until 2020 (R&D Strategy), prepared under the guidance of the ASM and approved in December 2013 by the Government, identifies five main objectives: capacities, research priorities, linkages, internationalisation, and governance of research. Approved by the ASM and currently being considered by the government, it fixed the R&D investment target at 1% of GDP by 2020. In both strategies are not identified clearly the thematic priorities (e.g. in R&D Strategy the six societal challenges of Horizon-2020 are mentioned as priorities).

2. RECENT DEVELOPMENTS OF THE RESEARCH AND INNOVATION POLICY AND SYSTEM

2.1 National economic and political context

Moldova is one of the poorest European country in terms of GDP per capita, which reached only $2,250 in 2012 (WB, 2013a). The GDP is in absolute figures quite low and depends highly on remittances from Moldovans abroad (more than a third of the GDP). With about 30 percent of the labour force, Moldova's emigrant population is in relative terms among the largest in the world (Bouton et al., 2011). However, remittances are expected to decline and a second engine of growth based on exports and investment is needed to ensure economy's growth.

The Government Programme for the period 2011-2014 entitled "European Integration: Freedom, Democracy, Welfare" aims to stimulate innovation and competitiveness as a basis of the economy. Major changes of the R&D and innovation system are foreseen, including a decentralisation of R&D funding and a strengthening of research in HEIs (ERAWATCH, 2013). In 2012 ambitious reforms started to be implemented, with EU financial support (EC, 2013). In the first quarter of 2013 a renewal of tensions within the ruling coalition, which led to the downfall of the Government, called political stabilisation into question. A new government, representing the Coalition for a Pro-European Rule in Moldova, was approved on May 31, 2013. The new government has set three priority directions: increasing the number of jobs, fight against corruption and accelerating European integration.

In the recent period, Moldova addressed most of the key recommendations contained in the last year's European Neighbourhood Policy Progress Report (EC, 2013). The 15h meeting of the Moldova-EU Cooperation held on June 25, 2013, has confirmed the completion of negotiations on EU-Moldova Association Agreement and on establishing a Deep and Comprehensive Free Trade Area (DCFTA). At the Eastern Partnership Summit, held in Vilnius on 29 November 2013, the agreement was initiated, despite different pressures on Moldova from the side of Russia (e.g., an export ban on the Moldovan wine industry, additional obstacles impeding progress towards resolution of the Transnistrian conflict), aimed at forcing the country to join the Russian-led Customs Union (EP, 2013). It is expected that in 2014 the association agreement, including DCFTA, will be signed, following the free travelling for the Moldovan citizens to the EU that has already been adopted (on 04/03/2014). Critical to achieving Moldova's development priorities, and to deeper political association and economic integration with the EU, are considered improved governance, stronger public administration, independent judiciary and strengthened rule of law.

As an open economy, Moldova faces also several other potential risks, including worsening conditions in the Eurozone and extreme weather conditions (WB, 2013a). Moldova has a small domestic market with limited competition and weak drive for innovation. Unfortunately, country has high cross border costs, and is not taking advantage of its proximity to wealthier regional markets due to its low endowment in institutional, human and natural capital. The EU is Moldova's first trading partner with 54% of Moldova's total trade - followed by Ukraine (15%) and Russia (12%). Agriculture remains a mainstay of the economy and a major income source for the bottom 40% of the population, although agricultural output is volatile and low market competitiveness is a key bottleneck. With 12% of GDP, agriculture trails the service and manufacturing sectors, but it employs 28% of the labour force in 2010, and when combined with the agro food sector, it represents about 50%of total exports (WB, 2013b).

Moldova's economy has recovered from the global financial crisis during 2010-11; it grew at an average rate of 6%. But in 2012, real GDP declined by 0.8% because the economy was hit by two shocks: slowdown in external demand and severe drought. The net foreign direct investments (FDI) halved from 4 %of GDP in 2011 to 2.2%in 2012, matching the low 2009 inflows in nominal terms (WB, 2013a). GDP growth is expected to rebound to 5.5% in 2013, driven by the recovery of agriculture. In the first quarter of 2013 the economy recovered again by 4.9 % (BNS, 2013a).

According to the Global Competitiveness Report (GCR) for 2013-2014, Moldova ranks 89 out of 148 countries, lagging behind most of its neighbours. It is classified in transition to an efficiency-based economy, while most of the European countries are either innovation-based or in transition towards an innovation-based economy (WEF, 2013). Moldova ranks 78th in the world on the "Doing Business 2014" index (83rd in the precedent edition), scoring especially poorly in dealing with construction permits (174), getting electricity (165) and trading across borders (150) (IBRD/WB, 2013). The country has worsened its position in the Corruption Perceptions Index from 94th of 174 countries in 2012 to 102nd of 177 countries in 2013; it is poorly ranked in comparison with its neighbours (TI, 2012). The World Bank experts consider that more needs to be done to attract FDI without granting revenue-eroding tax concessions. Companies cite unfair competition in domestic markets, primarily from companies using various tax evasion schemes and those protected by political and business interests through restrictive policies of various state agencies. Competitiveness and the ability to penetrate new markets are a problem, with very little expansion of Moldovan products to new destinations (WB, 2013b).

2.2 Funding trends

2.2.1. Funding flows

A national R&D investment had been seen initially by policy makers in 2004. It was foreseen to increase R&D expenditure steadily and to reach a level of 1% GERD as a share of GDP by 2008. This target was softened later and now reads "up to 1%" in the Code on Science and Innovation. In the partnership agreement between the government and the ASM, the 1% target was set for 2011, but as a result of an amendment it is now fixed annually (at a lower level) (ERAWATCH, 2013). In practice GERD as a share of GDP increased to 0.7% in 2008. Since then, however, it has been declining due to the economic crisis. In 2013 the Government committed to make budgetary allocations in science and innovation of only 0.34% of GDP, according to Partnership Agreement between the ASM and the Moldovan Government for 2013. In the R&D Strategy the general R&D investment target (for both public and private sectors) is fixed at 1% of GDP by 2020. An explicit national target for Business Expenditure for R&D (BERD) has not been fixed. But discussions are ongoing about increasing BERD, and different stakeholders are aware of this necessity. GBAORD and GERD data in the table below include information on innovation funding (via AITT); that does not exceed €1m per year. More comprehensive data on innovation funding does not exist, because in the current statistics there is no separately record regarding research and innovation funding.

Table 1. Basic indicators for R&D investments

	2009	2010	2011	2012	EU (2012)
GDP growth rate[1]	-6.0	6.9	6.4	-0.8	-0.4
GERD (% of GDP)[2]	0.59	0.5	0.4	0.4	2.06
GERD (euro per capita)[3]	6.1	6.1	6.0	6.2	525.8
GBAORD - Total R&D appropriations (€ million)[4]	19.9	19.6	17.7	19.2	86309,497
R&D funded by Business Enterprise Sector (% of GDP)	…	…	…	…	1.12 (2011)
R&D performed by HEIs (% of GERD)[5]	11.6	13.7	11.0	…	63
R&D performed by Government Sector (% of GERD)[5]	77.1	76.0	70.0	…	12

R&D performed by Business Enterprise Sector (% of GERD)[5]	11.3	10.3	19	…	24
Share of competitive vs. institutional public funding for R&D[2]	18:82	16:84	15:85	14:86	
Venture Capital as % of GDP (*Eurostat table code tin00141)*	…	…	…	…	0.025 (EU15)
Employment in high- and medium-high-technology manufacturing sectors as share of total employment *(Eurostat table code tin00141)*	…	…	…	…	5.6 (2011)
Employment in knowledge-intensive service sectors as share of total employment (*Eurostat table code tsc00012)*[6]	…	28.2	…	…	38.9 (2011)
Turnover from Innovation as % of total turnover *(Eurostat table code tsdec340)*	…	…	…	…	13.3 (2008)

Data sources: [1]World Bank; [2]Annual reports of ASM (or calculated based on); [3] National Bureau of Statistics (BNS) (population); [4]Reports of Ministry of Finance for 2009, 2010, 2011 and 2012 on implementation of the state budget; [5]UNESCO data; [6]GII-2013; …Data are not available
Note: The institutional public funding include also the institutional projects, which officially are distributed on competitive base, and competitive public funding include also PhD fellowships, allocated from the public R&D budget until 2013.

In the analysis of the above figures, it needs to be considered that only fragmented data on R&D funding and on performance of R&D are available for Moldova. GERD do not include R&D expenditure from general university funds and cover only a rather limited share of private R&D funding, as this is not yet recorded exactly in Moldova. It does not give therefore the whole picture of R&D funding and needs to be considered as an estimate. Furthermore, official figures do not include R&D funding in Moldova's breakaway region Transnistria. R&D funding is dominated by the government sector. R&D funding by business BES and Higher Education sector (HES) can be estimated as being rather low. It can be estimated that the share provided by different funding sources has not significantly changed in the last years. Most of R&D is performed also in the governmental sector, while the BES and HES perform significantly less.

2.2.2. Funding mechanisms

2.2.2.1. Competitive vs. institutional public funding

The public funds in R&I in Moldova are allocated in three main modes: competitive funding, institutional projects and other types of block funding (e.g. for libraries, experimental stations, administrative bodies such as SCSTD and CNAA). The main instrument remained Institutional Projects. According to estimations based on data from ASM reports, the share of public research funding allocated through this mode increased from 67%, in 2010, to 73%, in 2012. It is used for allocating basic funding to research institutions. Under the current legal framework this funding instrument is implemented on a competitive basis, through calls for proposals and submission of projects proposals. In practice this scheme is not competitive. Proposals do not compete with each other and the funding amounts are more or less pre-defined. The assessment and accreditation of institutions and their ranking by the CNAA is not yet taken into account in the distribution of institutional funding.

Truly competitive funding through a project-based mode has been reduced in recent years from 12% in 2010 to 9% in 2012. If we include in the competitive funding the PhD fellowships these figure are 16% and, respectively, 14%. The rest of public funds are distributed through other instruments, showing also a decreasing trend in the last period. There is an icreasing trend of the institutional funding at the expense of the other two funding types. The ASM administration decided, due to the declining public R&D funding, to cut the competitive and other schemes of funding in order to secure core funding of institutions.

2.2.2.2. Government direct vs indirect R&D funding[1]

Government R&D funding is allocated mainly in the form of grants. Other tools such as venture funding and subsidised loans are missing. Procedures for public procurement of innovative good and services are also missing. The grants schemes practically do not provide R&D funds to private companies (because they are not accredited). Only the innovation and technology transfer projects (ITTPs) financed by the AITT, provide incentives for companies to bring innovations to the market, which were developed in public research organisations (PROs). But the amount of government funding is small, being only €0.7m in 2012 (SCSTD, 2013). The design of these support schemes is not particularly focused on stimulating research within private companies (OECD, 2011).

Among government indirect R&D funding can be mentioned the tax incentives for residents of Science and Technology (S&T) Parks and Innovation Incubators (introduced in 2007), but which in reality were never applied. The development of new funding instruments and improving access to finance is foreseen in the Innovation Strategy.

2.2.3. Thematic versus generic funding

The distribution of public R&D funding on thematic priorities in 2012 was the following: (1) Consolidation of the State of Law and utilisation of cultural heritage with the perspective of European integration – 12.8%; 2) Efficient utilisation of human, natural and information resources for sustainable development – 28.1%; 3) Biomedicine, pharmaceutics and human health – 16.7%; 4) Agricultural biotechnology, soil fertility and food security – 26.9%; 5) Nanotechnology, industrial engineering, new materials and products – 13.0%; 6) Efficient growth of the energy sector, assurance of energy security, including the use of renewable resources – 2.5% (SCSTD, 2013).

In spite of these thematic priorities, most measures of R&D policy in the Republic of Moldova are generic ones and the procedures are identical for funding instruments, evaluation, monitoring, and reporting for all thematic priorities. From funding tools only the State Programmes for R&D are thematically focused. However, the topics in the programmes are kept rather broadly and the government funding allocated to this measure is modest. The financing of R&D programs decreased in the past five years more than 3 times, reaching €0.35m in 2012 (SCSTD, 2013), which represents only 2.2% of public funding of R&D projects in Moldova.

The government has outlined the topics energy and natural resources in its programme, which shall be supported specifically (MG, 2011). Both topics are major challenges for Moldova which shall be tackled via R&D. However this is still not reflected in R&D public budget.

2.2.4. Innovation funding

The general public budget or the budgets of Moldovan organisations do not include a specific financing line for innovation. National Bureau of Statistics does not calculate any indicator on innovation funding. It is therefore difficult to estimate the volume of innovation funding and to assess the balance between research and innovation funding. Only the AITT budget is assigned exclusively with measures for the promotion of innovation. But AITT funding does not exceed 5% of total R&I funding from public sources.

It finances the innovation through two main instruments:

[1] ***Government direct R&D funding*** includes grants, loans and procurement. *Government indirect R&D funding* includes tax incentives such as R&D tax credits, R&D allowances, reductions in R&D workers' wage taxes and social security contributions, and accelerated depreciation of R&D capital.

- Innovation and Technology Projects – the budget is around €1.2m annually, whereby approximately half of it was raised by private business;
- Innovation infrastructure (technoparks and innovation incubators) – the budget has decreased in the last period to €150-250 thousand annually.

Some innovation activities are funded by the Ministry of Economy, most of which through Organization for Small and Medium Enterprises Sector Development (ODIMM). The main programmes of ODIMM are:

- "PARE 1+1" - to attract remittances to the economy and to mobilise human and financial resources of migrant workers. The amount of grants awarded in 2013 is nearly €2m and investments of migrants - around €6m;

- National Economic Empowerment of Youth - for establishment of start – ups, support of young entrepreneurs in rural areas. In 2013 funding was around €5m;

- Credit Guarantee Fund - for start-ups the guarantee is 70% of the loan and the guarantee period lasts for up to 3 years. On 31.12.2013 the amount of investments with support of this instrument was around €4.5m.

Under these support schemes, innovation activities also receive financing, but there is no separate accounting for them.

Innovation funding through venture funds, innovation voucher and other similar instruments capable to stimulate innovation in business sector are not well developed yet.

2.3 Research and Innovation system changes

In 2012-2013 a number of changes in the R&D management have been made by the ASM as response to criticism of other R&D actors and experts concerning high centralisation of Moldovan R&I system (policy, funding and evaluation by the same institution). In 2012 Centre for Fundamental and Applied Research Funding (CFCFA) was established as an autonomous subdivision within the ASM. The aim is to improve the competitive allocation of public R&D funding, and to separate funding from policy and executive functions within the ASM. CFCFA allocates public funding for fundamental and applied research, and manages the main Moldovan funding programmes: institutional projects, state R&D programmes, grants for young researchers, projects for the procurement of scientific equipment, and projects for the organisation of scientific events. The CCE, a consultative body within ASM, was reorganised as a specific public institution within the ASM structure, in an attempt to separate the evaluation from policy-making and from executive functions.

At level of R&D performers, new institutions where accredited by the CNAA as R&D organisations in 2012-2013. The number of accredited organisations, eligible for public R&D funding, has reached 60. In ASM some institutional reorganisations were carried out (e.g., creation of the Institute of Genetics, Physiology and Plant Protection by joining two institutes).

Further changes are provided in the documents approved or under approval projects. For example, the Innovation Strategy stipulates creation of an Interministerial Council for coordination the State programmes in R&I, reorganisation of AITT in a public institution of the Government, establish the positions of advisors of the President and Prime Minister of the Republic of Moldova on R&I.

2.4 Recent Policy developments

The main policy initiatives in 2013 were the following:

The **Innovation Strategy of the Republic of Moldova for the period 2013-2020: "*Innovations for competitiveness*"**, developed by the Ministry of Economy and approved by the Government in September 2013, aims to ensure consistent horizontal policies, which will help to improve the country's international competitiveness and to build a knowledge-based economy. The Action Plan of the Strategy provides several institutional changes, but also specific activities to stimulate innovation activities (state procurement to stimulate innovation activity, the approval of Law on venture funds, improving national R&I statistics etc.). It is important that monitoring and evaluation of the Strategy will be made on the basis of the indicators used internationally, including those from IU scoreboard.

The package of reforms in R&I was approved by the SCSTD in January 2013. It provided a set of measure for improving project selection and evaluation, inclusively involving of foreign experts; adapt Moldovan indicators for R&I to EUROSTAT standards; enhancing the outreach and dissemination activities of science towards society; increasing human resources training continuing Moldova's integration in ERA. A report on package's implementation in August 2013 found that the most measures are still "in process of implementation".

The Strategy of research-development of the Republic of Moldova until 2020 developed by the ASM and approved by the Government in December 2013 represents the first national R&D strategy. The goal to be achieved is a system capable of creating high-performance scientific knowledge, which will lead to increased competitiveness of the national economy and contribute to the welfare of the population. Stipulated activities focus on five directions: capacities; priorities; linkages; internationalisation; and governance. However the set goals, although necessary, do not cover the whole system and the methods to be used for their achievements are missing in the strategy (Popa, 2012). Involving the universities in research is insufficiently addressed.

A new mechanism of financing public HEIS was introduced in 2013. It will ensure financial and managerial autonomy of public HEIs based on a non-profit principle. According to the Government Decision 983 of 22.12.2012, this process will be implemented gradually. Over the next two years financing will be based on a formula, which will include components such as the number of students, the form and area of education, and the degrees on offer. The funds from the state budget will be allocated for a global amount of expenditure for educational services, and not any more for separate expenses according to a detailed financial plan. Two mandatory inspection bodies will be established: the Ethics Commission and the Council for Monitoring the Management of State Budget Allocations.

In June 2013 the Parliament approved five **strategic directions of science and innovation for the years 2013-2020**: 1) Materials, technologies and innovative products; 2) Energy efficiency and use of renewable energy; 3) Health care and biomedicine; 4) Biotechnology; and 5) National heritage and development of the society. Strategic priorities formulated in loose terms coupled with insufficient detailing of priorities during calls for proposals cannot ensure the concentration of resources in the best R&D areas.

A new **Partnership Agreement between the Academy of Sciences and the Moldovan Government,** approved in August 2013, is foreseen only for one year – 2013, even if the two previous agreements were approved for a period of 4 years. This is determined by ample reforms initiated by the government in all areas, including R&I, and the expected changes in administration of this sector. The document included traditionally the general objectives and priorities in R&D sector, the rights and obligations of the parties. The Government committed to allocate in 2013 the funds for R&I in the amount of 0.34% of GDP.

Several other policy initiatives approved by the Government does not refer directly to the R&I system, but may influence its development. The Concept of industrial clusters development in the Republic of Moldova, approved in August 2013, provides the following potential effects on R&I: increasing demand for R&D from the side of enterprises, up-skilling of scientific personal, fostering technology transfer, development of branch research centres, access of scientific institutions to new sources of funding. The National Strategy for Development of Information Society „Digital Moldova 2020", approved by Government in September 2013 is meant to create a proper ground for the development and widespread use of the potential of the information technology and electronic communications by public institutions, business community and society in general, through the optimal intervention of the State. Implementation of the Roadmap for Government actions to eliminate critical constraints for business 2013-2014 and of the National Strategy for Regional Development 2013-2015, both approved in September 2013, can also have a positive effect on R&I, for the creation of the connections between private sector and research and expanding R&I activities at regional level.

At the end of 2012 the National Intellectual Property Strategy until 2020 was approved. It has the aim to strengthen the legal and institutional framework conducive to the creation, protection, management and full use of the IP potential, which should become a fundamental element of developing a sustainable economy based on knowledge and innovation and a source of national wealth for the Republic of Moldova.

2.5 National Reform Programme 2013 and R&I

The Republic of Moldova does not have a National Reform Programme as a document which would present the country's policies and measures to sustain growth and jobs and to reach the Europe 2020 targets. However, the Package of reforms in R&I of ASM includes a series of reform actions. New strategies approved or under approval (on innovation, research, education and IP) also contain elements of reform in R&I.

2.6 Recent evaluations, consultations, foresight exercises

The most important evaluation of national R&I system and policies in the last period was undertaken within the EU funded project IncoNet EECA. Policy Mix Peer Review Exercise in Moldova, carried out by S&T policy experts from Austria, Belarus, Estonia, Germany and Greece in 2012, focused on the following elements: public R&I system; private sector R&I; funding of R&I; HR; internationalisation and FP7 association; and regional dimension. The results were presented in a public meeting at ASM and contain recommendations on how to improve and align it to the best international practices, inclusively delegating policy implementation in terms of funding allocation for R&I to an independent agency; proper evaluation and impact assessment of research and research spending; better coordination of innovation support policies and cooperation on support tools between the ASM and the Ministry of Economy; increasing the share of truly competitive funding allocation; gradually involving of foreign experts in the evaluation of proposals to Moldovan competitive funding programmes; reconsideration of the system of public support for R&I activities in the private sector. Several recommendations of this review were taken up in the mentioned the Package of reforms in R&I and the R&D Strategy.

In 2011-2012 within the Moldovan-Romanian project FOR-MOLDOVA was held in Moldova a foresight exercise. There was no report made public of exercise or project, but according to information from the R&D Strategy, in the strategy is implemented the vision of R&I developed within Foresight exercise, involving national and international experts. This vision has been subject of public debate in 7 workshops attended by around 400 people.

The Innovation Strategy also is based on broad consultation, involving foreign and national experts within an UNDP project and previous studies conducted by local and foreign experts. Examples of such studies are those of Think-Tank Expert-Grup on Moldovan R&D and of Organisation for Economic Cooperation and Development (OECD) on SMEs development.

2.7 Regional and/or National Research and Innovation Strategies on Smart Specialisation (RIS3)

Moldova's R&I strategic vision is described in the Innovation Strategy and the R&D Strategy. Both documents contain an analysis of strengths, weaknesses, opportunities and threats to the national R&I system and proposes a series of objectives. However, stakeholders (entrepreneurs, universities) were poorly involved in developing Innovation Strategy. In the case of the R&D Strategy is mentioned that was made a foresight exercise, but stated objectives are not complemented always with appropriate measures. In both strategies are not identified clearly the fields / regions of specialisation (e.g. in R&D Strategy the six societal challenges of Horizon-2020 are mentioned as priorities). From the thematic point of view, the Strategies cannot be considered as specialisation strategies. On the other hand, the strategic directions of science and innovation for the years 2013-2020 approved in June 2013 by the Parliament are formulated rather broadly and it is not clear how they were identified.

At regional level only few R&I support ongoing and no special bodies for R&D development have been established, although there is great difference between Chisinau and the rest of the country's territory in research and economic activities. In accordance with the National Strategy for Regional Development were created structures for regional development and was established a financial instrument. Meantime, these support tools are not used for funding of R&D and innovation activities. Some EU cross-border cooperation programmes are relevant for Moldova in context of RIS3 (e.g., South-East Europe, Romania-Ukraine-Republic of Moldova Cross Border Cooperation, Black Sea Cross Border Cooperation). The Republic of Moldova benefits from EU support within this framework, including from the structural and cohesion funds, for different scientific and innovation activities. The first workshop in the area of smart specialisation was organised in September in the Republic of Moldova, via TAIEX, being hosted by the ODIMM.

2.8 Policy developments related to Council Country Specific Recommendations

Not applicable for the Republic of Moldova.

3. PERFORMANCE OF THE NATIONAL RESEARCH AND INNOVATION SYSTEM

3.1 National Research and Innovation policy

The performance of the national R&I system is modest in European context. In 2012, the R&D personnel amounted to 5,121 in head counts, out of which 3,338 were researchers (BNS, 2013b). The number of researchers per 1 million people is more than 4.5 times lower than in EU. This gap is likely to widen, given the trends of emigration of talented young researchers and low attractiveness of scientific careers. Share of population with tertiary education is relatively high, but the new doctorate graduates per 1000 people aged 25-34 is more than 5 times below the EU average. The GERD relative to GDP is 0.4%, about 5 times lower than the EU average, the large gap being determined by the marginal role of private business investment. The low R&D investment did not allow significantly upgrading or purchasing of new equipment, and funding of more substantial research infrastructure (RI). Despite the fact that some information and communication technologies (ICT) networks and databases are available and there is some equipment in leading institutions, the RI is still undeveloped.

The limited available human and financial resources in Moldova have obvious repercussions on the quality and excellence of knowledge production. In 2012 the Moldovan R&D system produced about 1,410 articles in national journals, over 1,800 articles in journals abroad and 208 patents (SCSTD, 2013). However, these results are poorly recognised internationally. Thus, in the Scopus database in the period 1996-2012 only 4,553 documents of Moldovan researchers are listed, which ranks Moldova on the 98th place in the world on this criterion and on the 103th place by citations (SJR, 2013). In the other major database, Thomson Reuters (ISI) Web of Knowledge, the performance of the national R&D system is also fairly low and according to the number of publications per million inhabitants the indicator for Moldova is 6 times lower than the average for new EU members and 15 times lower than the overall EU average (Cuciureanu, 2011). International cooperation is particularly important here, as about 70% of papers of Moldovan researchers have co-authors from abroad.

The number of patent applications of Moldovan researchers is relatively high compared to the number of population and the size of the economy – over 4,500 patent applications in the period 2006-2012 (WIPO, 2013). However, only 28% had duration of over 5 years in 2012. The small number of renewed patents is explained partially by the remission from taxes for a period of five years, which applies for Moldovan researchers. Other reasons for this situation are the low applicability of registered inventions (determined by the profile of the Moldovan economy), the weak links between business and R&D sectors, and, in general, by a low innovation culture. The number of patent applications at foreign patent offices is marginal. For example, in 2006-2011, only seven patent applications from Moldova were submitted to the European Patent Office, and only nine patent applications to the United States Patent and Trademark Office (WIPO, 2013). This can be explained by the high cost of registration and the fact that Moldovan researchers working in collaboration with foreign partners are rarely listed as first inventor.

The economic effects of outputs are rather limited. High-technology exports only represented 6% of manufactured exports in 2011 (WB, 2013a). On the other hand, the share of computer and communications services in total exports of Moldovan services is relative high (33.8%) and comparable with Eastern European countries (EEC), which indicates high competitive potential of this sector.

Table 2

HUMAN RESOURCES	
New doctorate graduates (ISCED 6) per 1000 population aged 25-34[1]	0.28
Percentage population aged 25-64 having completed tertiary education[2]	22.2 (2010)
Open, excellent and attractive research systems	
International scientific co-publications per million population[3]	70.0
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	…
Finance and support	
R&D expenditure in the public sector as % of GDP[4]	0.38
Public Funding for innovation (innovation vouchers, venture/seed capital, access to finance granted by the public sector to innovative companies)	…
FIRM ACTIVITIES	…
R&D expenditure in the business sector as % of GDP	…
Venture capital and seed capital as % of GDP	…
Linkages & entrepreneurship	…
Public-private co-publications per million population	…
Intellectual assets	…
PCT patents applications per billion GDP (in PPS€)	…
PCT patents applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	…
OUTPUTS	
Economic effects	
Medium and high-tech product exports as % total product exports	…
Knowledge-intensive services exports as % total service exports[5]	20.4 (2011)
License and patent revenues from abroad as % of GDP	…

[1] calculated based on CNAA and BNS data; [2] estimation of Expert-Grup, 2011; [3] calculated based on SCImago Journal & Country Rank /BNS data; [4] estimation based on ASM data; [5] GII-2013; …Data are not available

An exhaustive assessment of national R&I in the European context is difficult due to the lack of some indicators and quality of existing data at the national level and the fact that Moldova is not included in Innovation Union Competitiveness Report (IUCR) and the IU Scoreboard. For other information about national R&I performance see in annex 1.

3.2 Structural challenges of the national R&I system

The identified structural challenges for Moldova's R&I system include:

1) Lack of human resources for R&D. The Moldovan R&D personnel has decreased drastically from 25,200 in 1990 to 5,120 in 2012 (BNS, 2013b), due to local and foreign "brain drain" from the system underfinanced for years. For the remaining researcher stock a certain ageing trend can be observed: average age of the researchers reached 48.2 years (SCSTD; 2013) and the share of young researchers is below 25% (BNS, 2013b). The number of PhD students and new doctorates awarded remains low. Moldova is one of the few European countries where the number of PhD students decreased in the period 2004-2010 and as a result the number of PhD students per 1 million inhabitants is only 4.4 (2010), 4 times less than in Estonia and over 7 times less than Finland. According to the number of scientific degrees awarded annually in the period 2004-2011, Moldova, with an index of 0.5 (CNAA, 2013), also is far below the majority European countries that register values of 1.5-3 (EUROSTAT, 2013). Moreover, the share of students and PhD students in sciences and engineering (S&E) is significantly lower than previously and below the EU average. While in 1990 every second researcher was engaged in technical sciences, in 2010 it was only every fifth. Most PhD degrees in 1996-2010 were awarded in law, economics, education and medical sciences (almost 60%), while much less degrees are awarded in natural sciences or engineering. Thus several fields lack qualified researchers.

According to GCR for 2013-2014 on the indicator *Availability of scientists and engineers* the country is ranked on the 131th position from 148 countries (WEF, 2013).

It is difficult to attract young talent to take up a research career or retain capable and young researchers in a research position. Aside from the general economic situation of the country, this fluctuation can be attributed to the financial but also structural conditions for students and lecturers at universities and research institutions. As salaries are low, it is a common practice that professors increase their teaching hours significantly by lecturing at other universities. Because the stipends for PhD students are low (about €60 per month), they has to work in parallel to their studies. In addition, talented young people who left abroad usually do not return.

Moldova has experienced also large-scale emigration of other skilled workers. Moreover, there is a mismatch between the education provided and the needs of the real economy. The educational approach in HEIs is still rather traditional and not sufficiently targeted at the needs of the private sector. Student preferences have changed from natural to social sciences. As a result, finding workers with the relevant level of skills is a difficult task for employers. This lack of skills has a strong impact on the innovation potential of firms. The share of employees in technology-intensive sectors is very low. Adequate and qualified HR are missing to some extent for business R&D and innovation activities. Life-long learning is nearly absent: less than 1% of employees participate in any form of training (PRO INNO Europe, 2011).

Provision with HR from abroad is problematic. Moldovan universities are not very attractive and are missing in international rating, except Webometrics Ranking of World Universities. The number of foreign students is relatively low, with a share of 2.1% from the total (BNS, 2013c), while researchers and university professors from abroad almost are absent due to unattractive conditions of the labour market. In the GCR for 2013-2014 the country capacity to retain talent to attract talent recorded the lowest values, ranking 145th and respectively 146th from 148 countries (WEF, 2013).

2) Low R&D investments, especially by private sector, with no clear prioritisation.

The national R&D system is chronically underfinanced. The economic development in transition period left R&D completely marginalised up to 2003 and R&I funding nearly dried up in this period (to 0.22% of GDP in 2003). GERD increased to 0.7% in 2008 to drop again to 0.4% in 2012, due to the financial crisis (even if the GDP has been expanding again strongly since 2010). The national R&I funding targets have been lowered and financing of science and innovation de facto is not a national priority. The understanding of the importance of R&D as a basis for increasing of the competitiveness of the economy and for lowering the dependence of the country on remittances is rather low in the society.

The share of public R&D expenditure of total governmental expenses (1.6-1.8%) and of GDP (0.35-0.40%) is comparable with EEC, but due to low GDP in absolute terms it is modest. However, low funding of R&D is caused largely by reduced involvement of other sectors, especially of the BES. Although precise data are lacking, estimates are not encouraging and BES integration into the national innovation system is a difficult task. Thus the country ranks only 142nd of 148 countries in GCR for 2013-2014 on the indicator *Company spending on R&D* (WEF, 2013). Modest investments of the business sector in R&D are determined largely by the structure of the economy and by the distribution of the FDI stock in Moldova which are not encouraging for R&D performing activities. The industry is focused on trading and low-tech products. Low costs continue to be the main source of competitiveness. Innovation in the industry and in services is based mostly on foreign equipment and technology acquisitions instead in-house technological solutions, since few Moldovan enterprises have any innovative departments.

Moreover, it is difficult to identify clear thematic priorities of the modest governmental investments. The declared strategic or priority directions are so broadly formulated that enframe any scientific or technological activity. The well-defined science and technology areas (niches) to focus financial efforts are missing. This makes difficult orientation of R& towards supporting

competitive area of economy or to encourage the pursuit of technological specialisations. The distribution of public funds follows more a bottom-up approach, contributing to a weak integration of R&D into innovation system.

3) Weak links between R&D institutes, universities and BES. Research is not integrated in a proper innovation system and operates rather separately of economy and education. A linear conception of the innovation process is an obstacle for integration various stakeholders (OECD, 2011) and thus for networking of R&D sector with the rest of economy. Public R&D sector is not sufficiently oriented towards the economic and social needs, and research results are often not relevant to companies. Private companies also are not very open to cooperation with domestic research, inclusive due to the low absorption capacity of industry knowledge. Private firms have limited access to finance for their R&I activities and direct public R&I funding is not yet available. There is only little support for start-ups and spin-offs (PRO INNO Europe, 2011). Procedures for public procurement of innovative good and services are missing.

The universities are traditionally focused more on education rather than in research and have limited collaboration with both R&D institutes and business. The curricula are not in line with the needs of the industry. The universities, like research institutes, have limited experiences and capacities for patenting, licensing, start-up companies and other commercialisation efforts. The low level of development of connections between firms and universities and of clusters is confirmed by the score obtained by country in GCR for 2013-2014 on the indicator *University-industry collaboration in R&D* (129 position). As a result the economic effects of R&I system are insufficient (e.g., high-technology exports constitute only 6% din manufactured exports).

4) Inefficient innovation governance model. The weaknesses related to the governance of the innovation system are presented in several reports and analysis of international and local organisations (OECD, UNESCO, EC-Inco-Net EECA project, Expert-Grup, the Court of Accounts). The inefficient governance is observed also from GCR for 2013-2014, which places the country 134th on *Capacity for innovation* and 132th on *Quality of scientific research institutions*.

Based on the Code on science and innovation of 2004, the Moldovan innovation governance is highly centralised and has a rather academic character. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) experts consider that it is „a specific case of a post-Soviet R&D system that has not reformed substantially" (UNESCO, 2010). Policy formulation and priority setting, as well as policy implementation and evaluation are concentrated in the ASM and encourage more fundamental research (Popa, 2011). There is an obvious risk that such an innovation system is not very efficient and slow to respond to emerging topics. The low level of participation of the private sector in the governance (including lack of BES representatives in SCSTD), and in innovation activity in general, means that the ASM has only limited feedback from companies on the effectiveness and relevance of its activities and policies. Innovation policy coordination is generally at a fairly low level (OECD, 2011). The R&I have practically no role in the national development objectives identified in strategic planning documents (Popa, 2011). The accreditation procedure is too rigid for institutions oriented to R&D practical applications (EG, 2011). Policies and procedures used in ASM are not sufficient to ensure judicious exploitation of public resources and to effectively manage conflicts of interest (CA, 2011).

5) Undeveloped evaluation and monitoring system of R&I. The evaluation and impact assessment culture in R&I system are rather lacking. The regular and comprehensive evaluation mechanisms for all elements of R&I (system, policies, organisations, programmes, projects etc.) has not yet been established. Neither policies nor funding tools introduced since 2004 were object of evaluation. The assessment of organisations made by the CNAA and evaluation of projects are more developed. But evaluation of projects is basically limited to the

ex-ante evaluation, the many shortcoming of which being describing in reports of the Court of Audits. It creates the impression of a lack of connection between research performance and financial allocations. Provision of institutional funding is not based on any rigorous criteria of performance or results of academic accreditation, while the indicators used in the competitive funding are mostly quantitative and rather superficial (EG, 2011). The internationally recognised results are insufficiently prioritized in the evaluation process (Cuciureanu, 2011). There is no methodology for assessing the social and economic impact of the public R&D investments. However, there is a list of indicators for ex-ante, mid-term and final project evaluation under discussion, in order to be adopted by Government decision. A problem for of small local scientific community is an objective evaluation due to close relations of a limited number of available experts

There is also a lack of reliable and comparable R&I statistics according to the European methodology and standards. Moldova is not included in Eurostat statistics and is not covered in the IUCR or IU scoreboard. Among several statistical weaknesses, R&I activities in the BES are not recorded yet (BERD, HR in business, related innovation indicators). For several standard indicators such as GERD different data are available (e.g. of ASM, BNS or UINESCO). Some indicators are not calculated according to the Frascati Manual provisions (e.g., data of personal are not recorded in full time equivalent). This is not allow getting a clear picture of the R&I system and to have a more reliable basis for making policy recommendations.

3.3 Meeting structural challenges

The existing policy mix is partially suited to tackle the identified structural challenges faced by the innovation system. The analysis reveals overview that some challenges have not been comprehensively covered by the wide range of policy instruments (see table 3). Several policies actions have a declarative character or are general, without being translated into concrete actions appropriate and coordinated between them. The sectoral policies in general and innovation components of them is not well developed, which is a barrier to better addressing the challenges. Furthermore, the existing financing support for actions of R&I policies aiming to face the challenges is rather insignificant. The new strategic documents envisaged important reforms in R&I system and adoption of new policy mix, to ensure the transition from centralised system with an academic character towards an open innovation system focused on needs of economy and society. But it is too early to assess to what extent the newly established policies going to contribute to a better solving of problems in R&I system. Their success will depend largely on the volume of funding and the appropriateness of implementation schemes.

Table 3

Challenges	Policy measures/actions addressing the challenge [2]	Assessment in terms of appropriateness, efficiency and effectiveness
1. Lack of human resources for R&D	• Reforms in HE Sector in 2012-2013 (doctorate as 3rd cycle of HE, Roadmap for vocational education, financial autonomy of HE institutions, provision to create Agency for evaluation in education, other provisions in the draft strategic documents) • Envisaged measures in Innovation strategy (2013) for the orientation of training to need of labour market and innovation activities (fellowships in science and engineering, improvement of curricula etc.)	Orientation of reforms is appropriate in addressing this challenge. The measures set out in policy documents on education and innovation correspond to international best practice, but success depends on funding the implementation tools. Existing programmes have rather limited impact since modest financial resources allocated to them not allow a radical change of research framework, emigration remaining an option for many young talented people. The effectiveness of training HR for R&D sector

[2] Changes in the legislation and other initiatives not necessarily related with funding are also included.

	• The ASM programmes on research capacity building of HR (measures for attracting scientific diaspora, projects for young researchers, doctoral and postdoctoral fellowships) • Reforming the process of awarding scientific degrees in order to enhance quality (2013, new CNAA regulations)	seem to be also rather low, because the number of PhD graduates do not increase and the structure of graduates in HE is not in favour of sciences and engineering. The sustainability of collaboration with scientific diaspora can be questioned due to the finalisation of funding projects and lack of other schemes.
2. Low R&D investments, especially by private sector, with no clear prioritisation	• The Code of Science and Innovation (2004) and Partnership Agreement (2009) have provided objective of 1% of GERD from GDP • Creation of favourable conditions for starting up and running innovation business, for development of venture capital funds and other elements of stimulating R&D investments by private sector are envisaged in Strategy on SMEs (2012) and Innovation Strategy (2013) • Measures to stimulate international collaboration and attracting funds from abroad in 2011-2103 (joint funding programmes, prioritisation of international cooperation in R&D evaluation, removing constraints on wages from EU projects) • New R&D priorities in Parliament decision on strategic directions and R&D Strategy (2013)	The financial target was not been reached and was abandoned in the last years thereby providing no contribution to stabilising and prioritised R&D funding. The efficiency schemes to attract R&D investments from business private sector still are missing. The last strategic documents stipulate appropriate measures to address this challenge, but it remains to be seen if they will be translated into concrete actions with impact on R&D. International collaboration was intensified and financing from abroad plays an important role in R&D supporting. R&D directions in which funds are invested are broadly formulated and there are not established mechanisms through which resources are focused on priority directions. Overall it can be said that this is not addressed in a systemic manner.
3. Weak links between R&D institutes, universities and BES	• Measures of AITT to develop links between research and business (ITT projects; science parks and innovation incubators) • Measures of ME to stimulate business activities and innovation in 2012-2013 (actions for eliminating constraints to doing business; new business incubators and industrial parks; introduction of innovation elements in supporting programmes managed by ODIMM) • Provisions of Action plans of Innovation Strategy (2013) and Strategy on SMEs (2012) relating cooperation in the knowledge triangle education-research-business (state programmes to support start-up and introduction of innovation voucher, innovative investment schemes such venture capital and business-angels, public procurement of innovative goods and services; motilities business-research)	The implemented measures are partly appropriate because it does not address to all potential participants (e.g., only accredited entities are eligible for public funding). Moreover several instruments which have proved to be useful in other parts are not yet used (innovation voucher, some facilities for innovative start-ups etc.). Efficiency and effectiveness of undertaken actions is reduced, inclusively because the facilities provided by law to residents of parks and incubators were never implemented. The measure envisaged in new policy documents are mostly appropriate and meet international best practices. At the same time many of them still wearing a declarative character, because they have not mechanisms or funding schemes. Their efficiency and effectiveness would highly depend on the dedicated financial resources.
4. Inefficient innovation governance model	• Current governance model established by the Code of Science and Innovation in 2004 is the subject of several reform initiatives • The ASM actions on improving the R&D management in 2012-2013 (creation of CFCFA, reorganisation of Science sections and CEE) • Actions envisaged in Innovation Strategy (2013) for development of a R&I open governance model (Interministerial Council	The governance model whose inefficiency was mentioned in a number of international (OECD, UNESCO, EECA Policy mix) and national (Expert Group, Court of Auditors) reports maintained its main features. ASM actions are not sufficient to change radically the pattern; CFCFA and CCE still remain within ASM and depend of decision of ASM leadership; BES representatives still are not attracted in policy design. Provisions of Innovation strategy, which are the result of

	for R&I state programmes, reorganisation of AITT, enhancing the role of Ministry of Economy in coordination innovation policy) • Provisions for modernising R&I governance in R&D Strategy and in draft amendments in Code of Science and Innovation (creation of a National Agency for R-D and an R&D Advisory committee of the Prime Minister)	several years of discussions, are suitable, but their implementation and transposition of the legislation has not yet started. So it's too early to assess the efficiency and effectiveness. On the other hand, it is important that provisions of all strategic documents under approval which relates to innovation to be linked and coordinated each other.
5. Undeveloped evaluation and monitoring system of R&I	• Reorganisation of CCE and attempts of ASM to attract foreign experts in project evaluations (2012-2013) • Implementation of a new criteria and methodology for the evaluation of R&D organisations and ranking the accredited entities by CNAA (2011-2013) • New nomenclature of scientific specialities, adjusted to international standards (2013) • Provisions of Innovation Strategy and R-D Strategy to improve mechanisms and criteria for R-I evaluation (international evaluation of national institutions, introduction of new indicators and criteria etc.) • Provisions of Innovation Strategy and Package of reform of ASM (2013) to improve R&I statistics, inclusively implementation of EU Innovation scoreboard indicators by the BNS	The actions undertaken have not led to outline of a vision and integrated methodology for monitoring and evaluation of R&I. They addressed this challenge only partially since policies, system and funding instruments are not evaluated at all, and projects – in a limited way. Avoiding conflicts of interest and ensuring an objective assessment have not yet succeeded, including because efforts to attract foreign experts are not effective. Rather declarative provisions from approved documents can not address this challenge without the approval of the mechanisms and the allocation of funding. BNS is still lacking both competence and the financial resources in order to undertake, on a regular basis, a reliable assessment of some R&I activities, especially in the private business sector.

4. NATIONAL PROGRESS IN INNOVATION UNION KEY POLICY ACTIONS

4.1 Strengthening the knowledge base and reducing fragmentation

Promoting excellence in education and skills development

The number of researchers in Moldova has declined slightly due to the economic crisis, from 3,561 in 2009 to 3,338 in 2012; the total R&D personal amounted 5,121 in 2012 (BNS, 2013b). The data are underestimated, because official statistics do not consider R&D personnel in the private enterprise sector and universities researchers which are not financed from governmental R&D funds. As to UNESCO data there were 2.26 researchers per thousand labour force in 2011 and 2.42 researchers per thousand total employments (in FTE), which is much less than in most EU countries (UIS, 2013). In addition, the human resources of Transnistria have to be considered, which amounted to 562 R&D personnel in 2012, including 409 researchers.

The National Higher Education System includes 32 institutions, of which 19 state and 13 private universities. The number of enrolled students decreased constantly since 2006 and reached 97,300 in the academic year 2013/14. There were 273 students per 10,000 inhabitants (BNS, 2013c). A significant trend is, however, a strong re-orientation to social sciences, while a lack of students and graduates in ICT, sciences and engineering can be observed. The main mission of the universities is primarily focussed on education, while research activities and related links to business are weakly developed. The CNAA has accredited 16 universities as R&D performing institutions, including 13 state universities and three private ones.

The educational supply of the HEIs follows still is not sufficiently targeted at the needs of the private sector. In consequence, there are significant gaps between the specialisation and the training level of graduates and the expectations of companies. Results of a study indicate that that the share of Moldovan companies identifying low labour skills as a major constraint has almost tripled in 2007 – 2009 and reached 41.3%. A relatively large number of graduates entering the labour market claim that they need additional training in order to meet the job requirements. In the period 2005-2010 less than ¼ of university graduates were employed within one year (Ciurea et al., 2012). Creativity, critical thinking and other features of modern education are not yet sufficiently high on the agenda. Innovation entrepreneurship training is becoming more relevant, but not widely available. At the doctoral level, training is implemented still in a traditional way in Moldova (Technopolis, 2010). The PhD training remains largely unreformed (Ciurea et al., 2012). The majority of researchers receive their training in a traditional academic setting. They are therefore not adequately prepared for the market, to manage their IP, or set up an own company.

New national strategic documents foresee the actions to address this challenge. One of the five objectives set by the Innovation Strategy aims to empower populations with innovation skills, by adjusting training programs to the needs of innovation development, including the introduction of new courses relevant to the innovation process and the stimulation for students in science and engineering. The Strategy Education-2020 (draft) aims to provide relevant education to the economy and society, one of the specific objectives being "The upgrading the university curriculum in terms of focusing on the skills and on the economic needs." There have not been important changes in the last period towards an efficient framework for researchers. The employment conditions and working environment for researchers are not attractive. The average monthly salary of a researcher in a public research organisation was only €219 in 2012 (SCSTD, 2013). Salaries in several sectors of the economy are much higher than these average

levels, and the level of remuneration is hence one of the main factors which discourages talents to stay in research. Research and education organisations usually have a high degree of flexibility in setting the level of salaries for their academic staff. Individual income can vary significantly depending on the research projects, in which researchers are involved. This makes international cooperation projects with usually higher labour cost levels particularly interesting. A problem is also that research traineeships in companies and intersectoral mobility programmes are not yet available in Moldova.

With the current salary rates and infrastructure situation, Moldova is not a destination for inward mobility, although scientific positions are open also for foreign citizens and stateless persons. Foreign researchers are hired on the basis of an invitation for a specific period. The labour market is, however, in practice protected because non-nationals can only be hired if the position cannot be filled within 15 days with a local citizen. There are no funding schemes in place to attract foreign researchers to work in Moldova.

Transparency of recruitment procedures is limited. The announcements contain little information about job vacancies and usually do not include requirements for positions, selection criteria or the composition of the selection panel. External members are normally not included in selection panels. In most cases the job competitions and appointments for a period of 4 years are only a formality, as the positions are filled with staff already employed at the institution. ASM accepted European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers (Charter & Code) and CIP of ASM is part of the 4th cohort for charter implementation. In 2013 the national EURAXESS portal was launched. Moldovan researchers at the stage R2 and especially at the stages R3 and R4 do not often change their position. This continuity, as well as the limited transparency of recruitment and the lack of foreign researchers indicate a low level of openness of the national recruitment system.

Legal and other barriers hamper cross border access to and portability of grants. Portability of grants is in practice rather difficult and de-facto not feasible even at the national level.

Research Infrastructures

In 2011-2012, due to the reduction / stagnation of R&D expenditure, the allocations to infrastructure were very low, funding being focusing on remuneration of researchers. The scientific equipment older than 10 years constitutes about 37% of the total cost of equipment (SCSTD, 2013). Moldova has no national RI roadmap, but some support instruments are available for upgrading of infrastructure (e.g., the procurement of scientific equipment programme). The modern RI in Moldova is available mainly at leading research institutes and research groups that are internationally linked. In these conditions, accessing intergovernmental and European infrastructures is very important for the R&D system. At the moment no RI that provides transnational access to researchers is funded under the FP7 in the Republic of Moldova. There is no explicit policy formulated in the Republic of Moldova concerning European Strategy Forum on Research Infrastructures (ESFRI) schemes, and no funds have been committed for the ESFRI infrastructures implementation.

All national RIs are open to foreign researchers. Access is possible through participation in joint projects and as a result of bilateral agreements. But lack of significant RI is a limited factor in attracting foreign researchers. Access of Moldovan researchers to RIs abroad is facilitated mainly through international scientific projects. No financial support schemes to transnational access to RIs except for use of the major infrastructure Joint Institute for Nuclear Research (JINR) in Dubna (Russia), where Moldova was one of the co-founders.

4.2 Getting good ideas to market

Improving access to finance

Access to finance is clearly among the challenges for innovation policy in Moldova. Most governmental financial resources for R&I are allocated directly to scientific research activities. The majority of support measures target PROs and only few stimulate business R&D and innovation activities. R&I funding is mostly traditional direct funding, made available in the form of grants. Private firms are practically excluded from governmental funding for R&I, since only entities accredited by the CNAA can receive public funding for R&D. The accreditation criteria are strictly oriented to academia, thus irrelevant to the business sector's interests and capacities. The scope of AITT's support tools is limited and their results are still uncertain (OECD, 2011). Tax incentives for residents of S&T Parks and Innovation Incubators stipulated by law were never applied in practice because of different interpretations of the law. The impact of ITTPs is limited by the modest public budget available for the programme and the difficulty of attracting project partners and funding from the private sector. A regular evaluation and benchmarking of funding schemes is not made. A favourable legal environment for spin-offs from research organisations and universities and for new start-up firms is missing too.

Funding from abroad, in particular from international banks and agencies for international development of other countries, has a considerable importance (PRO INNO Europe, 2011). With this support ODIMM developed certain schemes for establishing of start – ups, support of young entrepreneurs in rural areas ("National Economic Empowerment of Youth"), attracting remittances from abroad for investments in Moldova ("PARE 1+1") and training programmes to enhance entrepreneurship. The Government established a Special Guarantee Fund to improve access to finance to SMEs: for start-ups the guarantee is 70% of the loan amount. All these schemes do not target specifically business R&I, but innovation activities can be funded in their framework.

Bank financing remains the main source of external funding for companies, particularly for SMEs with growth needs which cannot be covered by microfinance. Credit penetration is limited compared to similar economies and a large number of companies consider the lack of access to credit as a very significant obstacle to their development. Difficulties in accessing bank lending result in limited investment potential of companies and hamper related gains in productivity (OECD, 2011). Other nonbanking financial institutions and support measures are not well developed yet. The need for venture capital funds has been recognised and a proposal for the creation of a national venture fund was made in a draft law.

Only few demand-side policies are implemented in Moldova. The available stimulation measures reflect a focus on the supply-side of innovation policy. Regulation and standardisation have become quite relevant through the national programme to adopt international and European standards. The government programme underpins this priority of harmonisation of national legislation and practices with European ones. But this process is top-down driven by government and not based on voluntary cooperation among industry, consumers and public authorities. A more advanced sector in demand-side policies is the renewable energy sector. Measures include direct funding of R&D projects and some actions concerning the implementation of international environmental and energy saving standards. Thus BAS project of the European Bank for Reconstruction and Development has awarded grants to SMEs in the implementation of energy efficiency projects in the amount of 2.2 million Euros in 2012. To promote the demand-side of innovation more effectively, the innovation policies of the Ministry of Economy would have to be better coordinated with the activities of a range of other agencies.

Protect and enhance the value of intellectual property and boosting creativity

Moldova has a relatively well-regulated framework of IP, coordinated by the AGEPI. In the period 2007-2010 the regulatory framework related to the IP has been revised, being adopted six special laws harmonised with EU legislation, so that the national legal framework is in line with the Community rules (NIP Strategy, 2012). However, implementation of legislation is a critical factor. The main impediments to full approximation in Moldova to EU standards, according to experts, relate to: inadequate coordination of enforcement agencies; the absence of a strategic direction to enforcement; staffing and other resource constraints; the continuing need for further training of enforcement bodies and for further awareness raising initiatives; the absence of sufficient engagement of right holders in the enforcement effort etc. (Stuart et al., 2010).

According to the annual reports of the AGEPI, there is an increasing interest in patenting activity at the national level over the recent years. This is due to „short-term patents" for which the relevant procedure is simpler, faster and cheaper than the usual one. Most of the patent applications belong to the Universities and R&D Institutes (54% of the total number in 2003-2011). Only a small percentage (4%) of the total number of patents is filed by business enterprises and organizations. Shortages of qualified attorneys and specialized consultants on IPR issues often result in a modest quality of the applications filed. Moreover, the level of implementation remains low. Overall, in the last 6 years, the total number of granted titles of protection (mostly utility certificates, trademarks and to a lesser extent industrial designs) has decreased, as a result of the de-industrialization of the country.

In order to promote IP system AGEPI organizes training courses on IPR issues, as well as campaigns, exhibitions and other events for dissemination of information, prize awards etc. The accredited R&D organizations have at least one person responsible to provide support for patenting, commercialisation and implementation of patents.

Several provisions in line with IU and ERA objectives are included in the National Intellectual Property Strategy until 2020, approved in late 2012, the first objective of which is encouraging the creation, protection and use of IP as a key tool in creating conditions for the country's transition to innovation model of economic growth. The Strategy Action Plan for the period 2012-2014 contains 30 specific actions to achieve this objective.

Public procurement

In the Republic of Moldova, procurement law and policy is treated as a feature of budgetary discipline by the state, whilst grounded on principles of administrative law, rather than as an aspect of economic and competition policy. The national authority in the field, the Public Procurement Agency, operates with an emphasis on supervising individual procurement rather than a driver of policy that would result in greater efficiency, economies of scale, etc. (Stuart&Dalby, 2010). Procurement policies are not yet specifically innovation oriented in Moldova. The Law on public procurement of 2007 does not include any provisions that would specifically stimulate purchasing of innovative products and services (PRO INNO Europe, 2011). In September 2013 the government approved four new regulations which set new methods of carrying out the public procurement – via competitive dialogue, using the negotiation procedure, dynamic system and e-tenders. The harmonisation of the national legislation with EU rules should have repercussions on stimulation of innovation and R&D through improved public procurement practices. This is provided in Innovation Strategy that includes 3 actions grouped under „*The state procurement to stimulate innovation activity*".

4.3 Working in partnership to address societal challenges

The Republic of Moldova participates in three initiatives of the first European Innovation Partnership (EIP) – on Active and Healthy Ageing (Patent medication adherence programmes; Knowing effects on healthy life years; and Innovative medical technologies for active and healthy aging). Given the specialization of Moldova it would be good prospects for participation in EIP on Agricultural Sustainability and Productivity. Overall, in Moldova it is a lack of information about EIPs and lack of awareness of the necessity to participate in these partnerships. Thus, approved Innovation strategy does not mention anything about EIPs.

As to cross-border collaboration, scientific fields are defined broadly in the majority of cases. Since Moldova's association to the FP7, the priorities of the framework programme (FP) as well as the societal challenges of the upcoming EU funding programme, the Horizon 2020, are becoming increasingly important. But thematic priorities depend also on the R&D capacities available in the country, where fields like agriculture, physics, chemistry, ICT, and materials may be mentioned. The R&D Strategy foresees measures to align the national R&I system to developments at the EU level (e.g., the six societal challenges of Horizon-2020 are envisaged to be addressed). Therefore it can be expected to increase the Moldova's involvement in EIPs.

The Republic of Moldova also participates within two Joint Programming Initiatives: Cultural Heritage and Global Change: A New Challenge for Europe and Water Challenges for a Changing World.

4.4 Maximising social and territorial cohesion

Moldova does not have a National R&I Strategy on Smart Specialisation (RIS3) or other strategic document developed on the basis of this approach. Even if some characteristic elements were used in R&D and Innovation strategies, it is not set regional / thematic specialisations and it is lack of actions for maximising the social and territorial cohesion. The need to use smart specialisation approach is still poorly acknowledged. However, some assessments of the innovation capacities of the regions are included in the Innovation Strategy. Chisinau is described as a capital with a great innovation potential and the other regions are characterised either as lagging agricultural regions or industrial regions in decline or with growth potential. One of the risks in the strategy implementation, fixed in the document, is polarised economy from a regional perspective, and one of the principles of state policy in the field of innovation is indicated principle of maximizing social impact**.** Moreover, the positive impact of the Strategy will be assessed also through progress in regional development.

In the Republic of Moldova in the last period a framework for regional development have been created: strategies at national and regional level, the actions plans, structures and a financial instrument, consisting of 1% of annual budget revenues and other financing sources. But it still includes insufficiently innovation and smart specialisation aspects. An opportunity for this purpose may be cross border regional programs funded inclusively under the EU structural and cohesion funds. Until now these instruments have funded several R&D and innovation activities. However, to take full advantage of these programmes, the setting of priorities in compliance with smart specialisation approach is absolutely necessary.

4.5 International Scientific Cooperation

International R&D cooperation can be considered as a success story of Moldovan S&T policy-making. It was highly important for Moldova since its independence and helped increase financial resources for leading teams, allowed building linkages with foreign researchers and access to modern infrastructure.

Priority for Moldova's international scientific cooperation is integration in ERA. This is manifested both in multilateral and in bilateral cooperation. Beginning with 1 January 2012 Moldova became an associated member of the FP7 and made some measures to benefit from this fact (establishing National Contact Points and of the Moldovan Office for Science and Technology (MOST) in Brussels, awareness rasing on the FP among the local scientific community). Moldova has in 2013 already expressed its interest to become associated to the new EU FP, the Horizon 2020. The participation in EU programmes it is a great chance to gain new perspectives for the whole knowledge based system, but it needs additional efforts and accompanying direct measures on national level. With status May 2013 Moldovan teams were involved in 249 FP7 proposals. Out of these proposals 42 were accepted, involving 52 Moldovan research organisations. This gives a success rate of 17.6% (EU average 20%). These organisations have received more than €3 million in EU funding. The highest number of applications was recorded in the People programme (49 proposals / 10 accepted), international cooperation (41/10), SSH (33/1), ICT (33/6) and environment research (19/1). A weakness of Moldovan participation is its limited involvement in research projects, especially in generic collaborative projects (8/1). Most of Moldovan teams are involved in supporting (55/12) and coordination (28/8) actions within FP7 (data provided by the European Commission in May 2013).

At the bilateral level Moldova has signed about 50 bilateral agreements, which foresee scientific cooperation (mostly in the frame of a broader cooperation approach). Most of them however do not have a practical impact and remain at the level of intentions. ASM has focussed on cooperation with some of the EU member states and has established joint R&D funding programmes with France, Germany, Italy and Romania. A series of actions on mobility and training in R&D takes place in cooperation and with the support of Estonia. Cooperation agreements are in place with a range of partner academies of sciences, which include exchange of researchers in all different scientific fields. The academy has concluded such agreements with the academies of sciences of Austria, Bulgaria, Czech Republic, Hungary, Poland and with the Royal Society of the UK. Bilateral R&I cooperation with Romania and Germany are the most important in terms of funding activities in the most recent years. Besides the EU, Moldova has traditionally strong R&D cooperation with Commonwealth of Independent States (CIS) countries. The scientific cooperation with Russia, Belarus and Ukraine is institutionalised through joint funding programmes. Bilateral R&D cooperation with Russia is the longest lasting and has been the most important among non-EU countries, but cooperation with Belarus is the most important in terms of frequency of funding activities. In 2014 the joint bilateral programmes with Germany, France, Italy, Romania, Ukraine and Belarus will be funded. What concerns Transnistria, its limited R&D capacities are focused on cooperation with Russia. This orientation is due to the overall political situation with Transnistria; this breakaway region is depending on Russia.

Moldova participates also in several multilateral cooperation schemes in the post-Soviet space. A relevant forum for R&D cooperation is the Science and Technology Centre in Ukraine. This international organisation operates with resources provided by the EU (via Europeaid), the USA and other international partners and supports R&D projects in Ukraine, Moldova and other countries of the former Soviet Union. Another important multilateral cooperation is performed by the Moldovan researchers in the framework of the major infrastructure JINR (Russia).

Another regional focus of Moldovan international R&D cooperation is the USA. Since the beginning of the 1990s, cooperation is actively supported through local offices of American R&D support funds. This cooperation was somewhat disproportionate, represented mainly by mobility of Moldovan researchers in the U.S., because Moldova doesn't have capacities to attract talents from the U.S. Further bilateral cooperation agreements are in place with academies of science of China and Turkey.

By way of cooperation schemes foreign researchers come for short term stays to the country. They have definitely helped to increase short term inward mobility of foreign researchers to the country and to counterbalance to a limited extent the usual mobility pattern, where only Moldovan researchers move abroad. However, Moldova remains unattractive as a destination for research. There are, de-facto, no foreign researchers working in Moldova and it will be difficult in the near future for Moldova to attract foreign researchers, because of the dire conditions such as low salaries, outdated equipment, and teaching overload in universities under which research has to be performed. A little better is the situation with foreign doctoral students, who constitute 14% of the total (CNAA, 2013).

5. NATIONAL PROGRESS TOWARDS REALISATION OF ERA

5.1 More effective national research systems

A multi-annual strategy for R&D and innovation is currently fixed mostly in the Partnership Agreement between the ASM and the Moldovan Government. The agreement for 2009-2012 years stipulated that Government Budget Appropriations or Outlays on R&D (GBAORD) should reach 0.8% of GDP in 2009, 0.9% in 2010 and in the remaining two years 1%. As a consequence of an amendment to the agreement, these targets were removed and now a target is fixed annually, albeit at a lower level. The economic and financial crisis caused a severe decrease of research funding in Moldova. The percentage of public R&D funding as a share of GDP decreased from 0.7% in 2008 to 0.4% in 2012. No official statistics are available for BERD. BES performed a moderate 19% of GERD in 2011 (UIS, 2013). The most recent strategic document, the R&D Strategy, fixed the R&D investment target only at 1% of GDP by 2020.

Public block funding is provided via Institutional projects, a semi-competitive funding scheme. It reached 71% of public R&D funding in the period 2010-2012, while project based competitive funding amounted to 10.5%, with other types of funding reached 18.5%. Other types of funding include block grants for administration, for facilities, for subordinated agencies to ASM and for infrastructures. The trend is on decreasing the share of competitive funding in favour of institutional. It was the reaction of the ASM administration to the declining public R&D funding.

Competitive R&D and innovation funding based on evaluations has been introduced, starting mainly in the 2000s. The focus of evaluation in Moldova is primarily on research organisations, and on R&D and innovation funding programmes and projects. Evaluations are usually performed by national experts, whereas in only few exceptional cases international experts have been used. The reliance on national experts poses a problem to an objective selection of projects, because of the close relations of experts in a small scientific community. The results of institutional assessment are not linked with the volume of institutional funding allocated for accredited organisations. Because of the short period of application, the culture of evaluation, monitoring and international benchmarking is still in a developing phase.

5.2 Optimal transnational co-operation and competition

The transnational scientific cooperation is a success story of Moldovan S&T policy making. Due to the association of the Republic of Moldova to FP7, the international dimension of research and development in Moldova is increasingly recognised as essential and participation in FP7 has intensified. The country implements common research agendas both in European initiatives and bilateral programmes. Joint R&D funding programmes are established with the EU Member States Germany, Italy, France and Romania. Moldova is also involved in FP7 funded international networking projects for the region (INCO-NETs), in European Research Area Networks (ERA-NETs), and in the COST programme. However, the involvement of Moldovan teams in joint activities is limited because of scarce funds and a lack of well-developed large research facilities in Moldova. National public funding allocated to transnationally coordinated R&D amounts to about 2.5% of GBAORD. Internationalisation policy concentrates on utilising

international programmes for strengthening the competitiveness of Moldovan research organisations and researchers. The opening of national programmes is not a priority of R&D policy. National funding programmes are open to research organisations accredited within Moldova, and to foreign researchers employed at a local R&D organisation or on a self-financing basis. Foreign evaluations are recognised in national funding decisions to some extent only in bilateral funding programmes. There is no specific RIs strategy in the country. Moldova puts, however, particular emphasis on e-infrastructure and participates in different European and regional network infrastructures for advanced internet services for the research community.

5.3 An open labour market for researchers

The employment and working environment for researchers is not attractive. Cuts in public R&D funding, an unstable economic situation and limited career opportunities have a negative impact on attracting young people to research. As an answer to this precarious situation, authorities have put in place some measures to remove barriers to researcher mobility, to provide training and make careers more attractive. Special schemes for attracting and retaining young people in research (scholarships, projects, awards) were established.

ASM has recognised the Charter & Code, and the Declaration of Commitment to provide coordinated personalised information and services to researchers through the pan-European EURAXESS network. In 2013 the national EURAXESS portal was launched, but appropriate awareness raising measures need still to be considered. Joining these European initiatives has not yet led to significant policy actions. Recruitment policies are not always open, transparent and merit based. National grants are de-facto not portable. Doctoral studies remain largely unreformed. The most significant problem for career attractiveness and mobility remains the low level of salaries, of stipends and of infrastructure expenditure.

5.4 Gender equality and gender mainstreaming in research

Women and men have equal rights in education and in getting positions in the academic and other R&D institutions. While the proportion of women in tertiary education is higher than that of men, it is lower at the PhD level and in academic positions. In particular, the share of women in top-level positions and in decision-making bodies is well below that of men. For example in the newly elected Assembly of ASM (2013), which is the supreme governing body of science in Moldova, women make up only 7%. One of the main reasons is a traditional attitude towards the role of women in society and the family, where leading positions are filled mostly with male colleagues. Another reason is infrastructure, marked by a lack of child-care facilities. In science a horizontal segregation can be observed, with a net predominance of women in the social sciences and an under-representation in technical sciences.

In the last three years no specific actions were taken in the R&D field to enhance equal opportunities for men and women. However, at the national level a series of actions and laws has been approved to ensure gender equality, which can also be applied in R&D. These regulations relates to gender mainstreaming, to women in decision-making, to the employment and labour market, to education and healthcare, and to increasing public awareness concerning violence against women and human trafficking. A key initiative is the creation of a gender unit in each of the central public administration authorities.

In the R&D however no charters, action plans, and specific boards or other bodies for gender policy have been set up so far. Gender targets and quotas have not yet been defined. The integration of a gender dimension into the design, evaluation and implementation of research is also missing.

5.5 Optimal circulation, access to and transfer of scientific knowledge including via digital ERA

The main legal document for the science sector in Moldova, the Code on Science and Innovation includes a separate section for ensuring an appropriate information provision for science and innovation. However, experts consider that the state policy does not sufficiently guarantee open access (OA) to scientific research financed from public funds, and that no mechanism for ensuring OA to scientific and technological information resources has been specified (Turcan, 2012).

Open access and preservation of scientific information is mainly promoted by the association Electronic Resources for Moldova (REM). In partnership with EIFL it managed to develop an active OA movement in Moldova. As a result awareness has been raised on the necessity of OA, several research organisations have adhered to OA principles, and institutional repositories have been created at some institutions.

Several measures have been taken at the government level to guarantee access to information, including to scientific information, for the general public. A government portal for databases and an M-Cloud platform have been established, and online public services have been developed. Further measures are foreseen in the draft Strategy Digital Moldova 2020. One of the mentioned objectives is a full digitalisation and availability of the scientific heritage. Access to internet (via GEANT) and information technologies is made available by the RENAM association for a consortium of most research institutions and universities. RENAM relies on international cooperation for these services.

The technology transfer from the public to the private sector and the innovation support is provided mainly by AITT schemes which include ITTPs, as well as funding of innovation and technology transfer infrastructure. In spite of these efforts, the knowledge sharing and circulation between the public and private sector is recognised as one of the major challenges for R&I in Moldova.

Annex 1. Performance of the national and regional R&I system

Feature	Assessment	Latest developments
1. Importance of the research and innovation policy	(-)R&D policy is weakly linked with other relevant policies for innovation and the mix of these policies is not yet sufficiently geared towards fostering innovation and strengthening the knowledge base (-)The strategic directions in R&I and funding are not focused to address major societal challenges while at the policy level there are some signals on such priorities	(+)Elements of a more strategic, coherent and integrated framework for promoting R&I in Innovation Strategy (+)An explicit orientation towards addressing major societal challenges in draft strategic documents on R&I and education (-)Broadly formulated priorities in Parliament decision on R&I strategic directions
2. Design and implementation of research and innovation policies	(+)A stable framework for promoting R&I policies, clearly defined roles in the design and implementation of actions (-)Centralized model of government not ensuring the involvement of all relevant stakeholders (-)Lack a multi-annual strategy on smart specialisation (-)Inefficient monitoring and evaluation system of R&I policies	(+)Provisions to create new structures for more effective coordination and implementation of R&I policies in Innovation Strategy (+)ASM proposals for a new R&I governance model (-)Innovation and R&D Strategies do not meet the elements of a smart specialisation strategy
3. Innovation policy	(+) The concept of innovation is declared as way for shift from the current economic model based on remittances to a new model based on competitiveness in strategic documents (-)Weak consideration of other forms of innovation than technological one (-)Predominance of the supply-side policies	(+)Innovation Strategy promotes broad concept of innovation and aim to stimulate it in economy and society (+)Strengthening the attributions in developing and implementing innovation policies by the Government
4. Intensity and predictability of the public investment in research and innovation	(-) The public investment in R&I oscillated at a relatively low level, despite the fact that were fixed financial targets in policy documents (-) The mode of distribution of public funding is not stimulating for greater private sector investments (-)Tax incentives provided by the legislation for residents of science-technological parks and incubators have never been applied; undeveloped public-private partnerships	(-)R&D Strategy fixed a financial target of R&D investments only to 1% of GDP, by 2020 (-)Innovation Strategy does not contain any financial target
5. Excellence as a key criterion for research and education policy	(+)Evaluation of project proposals and institutes is based on criteria compatible with those internationally accepted (+) HE and research institutes have sufficiently autonomy to organise their activities, inclusively in recruitment employees and attracting funding (-) Excellence as a key criterion in funding and career advancement is affected by lack of critical mass of small community and ethical misconducts of post-soviet science (-)Share of competitive funding is low, while institutional funding does not take into account the results of evaluation and accreditation process (-)Portability of grants is not possible (-)The framework for research careers is rather unattractive and no incentives to attract researchers from abroad	(+)Strengthening financial autonomy of universities (-) Rather formal reorganisation of evaluation system of ASM, which does not ensure avoiding conflicts of interest, full use of output indicators, international benchmarking and ex-post evaluation tools
6. Education and training systems	(-)Inefficient policies to ensure a balanced structure of graduates by fields in HE (-)Faulty connections between the educational system and the labour market, business, R&D (-)Curricula is congested, has a high degree of theorization	(+)Draft of Education Strategy and Code address the most of challenges (+)Creation of an Agency for evaluation in education is envisaged in amendments of the Law on

	and does not provide relevance for personal, social and professional development of the beneficiaries (-)The system is insufficiently focused on training transversal competences and entrepreneurship and innovation skills	education
7. Partnerships between HE institutes, research centres and businesses, at regional, national and international level	(+)Transnational partnerships and collaborations have a favourable framework (-)Tools to stimulate cooperation in the knowledge triangle education-research-business are weakly developed and only slowly emerging (-)Some financial institutions and support measures that have proven to be effective in other countries are not created yet (e.g. innovation vouchers)	(+)Legislative and institutional measures for stimulating participation in EU programmes (+)Instruments to support the commercialisation of innovative ideas are provided in Innovation Strategy
8. Framework conditions promote business investment in R&D, entrepreneurship and innovation	(+)The legal framework for doing business is improving (+)A relatively well-regulated framework of IP rights (-)The legal framework is not in favour of business investments in R&I activities (-) Governmental programmes for entrepreneurship have a weak R&D and innovation component (-) Lack of venture funds and of legislative framework for their creation (-) Lack of incentives to researchers at universities and public institutes in order to establish innovative spin off and start-up companies	(+)Coordination of entrepreneurship and innovation policies by the same body (Ministry of Economy) (+)Favourable provisions in new strategies (on SMEs, Innovation, Intellectual Property) (+)Roadmap for eliminating constraints for doing business
9. Public support to R&I in businesses is simple, easy to access, and high quality	(-)BES practically does not have access to public funding for R&D activities due to difficulties to meet accreditation criteria (-)Inefficient use of existing tools to provide indirect support to business	(+)Proposals to change the procedure and criteria for scientific accreditation for BES entities (-)Cancellation of tax exemptions for residents of S&T parks and incubators
10. The public sector itself is a driver of innovation	(+) Adopted Open governance model provides modernisation of public services and improving governance by using innovation solutions (+) The government-owned data is made freely available as a resource for innovation (-) Procurement law and policy is treated as a feature of budgetary discipline by the state rather than as an aspect of economic and competition policy	(+)New e-services available for citizens and business (+)New information resources uploaded (-)Four new regulations on procurement do not include incentives for innovation

Annex 2. National Progress on Innovation Union commitments

		Main changes	Brief assessment of progress / achievements
1	**Member State Strategies for Researchers' Training and Employment Conditions**	(+)Declaration of the ASM of Endorsement of the European Charter for Research and the Code of Conduct for Recruitment of Researchers (2011); (+)Approval of the Code of ethics and professional conduct for researchers and university staff by the NCAA (2012); (+)Modification of legislation to enable researchers involved in international projects to receive wages at a European level (2012); (-)Cuts in public funding for R&D and HE Sectors in the last years; (+)The national portal EURAXESS was launched (2013).	(+)Stimulating international research and fostering scientific ethics compliance by approving indicated acts; (+) New services provided by the national portal EURAXESS; (-)No changes in the legislation and mechanisms to transpose the Charter & Code principles (-) Doctoral studies remain largely unreformed; research traineeships in companies and intersectoral mobility programmes are not yet available; (-) The reflection of funding cuts in maintaining the low level of salaries, of stipends and reduction of infrastructure expenditure, which makes to decrease attractiveness and career mobility;
4	**ERA Framework**		
5	**Priority European Research Infrastructures**	(+)Signing the joint declaration on e-infrastructure of the member states of the Eastern partnership (2012), in support of creating a common regional e-infrastructures and implement the most advanced technologies; (-)Dramatic reduction of public funds for procurement of scientific equipment in the last years.	(+)The connections to EU e-infrastructure facilitate the exchange and cooperation with the European and international research communities (-)Funding cuts emphasizes the country's difficulty to develop significant RI which would be included in the EU portal on RI Database.
7	**SME Involvement**	(+)Incentives for innovation in the Strategy on SMEs (2012): innovative investment schemes; business incubators within universities; IP pre-diagnosis services etc. (+)Innovation Strategy (2013) provides: support for cluster development and for joining of national innovative SMEs to the European and international business associations; including of innovation components in state support programs for SMEs; state programmes to support start-up and introduction of innovation voucher etc. (+)Three new Business Incubators opened in 2012	(+) The introduction of provisions in policy documents favourable to the development of innovation in SMEs; (-) Poor implementation of the provisions of the plans and programs; (-) Still low interest from SMEs for innovation and lack of collaboration with universities and research organisations; (-) The weak involvement of national SMEs on EU R&I programmes.
11	**Venture Capital Funds**	(+)The Innovation Strategy (2013) provides developing the law on venture funds and support for linking Moldovan SMEs with funders of "business angels"	(-) Lack of venture capital funds and other nonbanking instruments, due to the lack of the legal framework
13	**Review of the State Aid Framework**	(+)Law on State Aid (2012) mentions that State Aid for R&I is compatible with a normal competitive environment.	(-) Moldovan legislation does not specify the conditions that allowing the State Aid in R&I according to European norms.
14	**EU Patent**	(-)No actions.	(-) Moldova is not in a position to ratify the Agreement on a Unified Patent Court
15	**Screening of Regulatory Framework**	(+)The Roadmap for Removing Critical Barriers in the Business Environment was approved in 2013 as result of screening of Regulatory Framework; (+)The Innovation Strategy (2013): general assessment of legal framework related to innovation.	(+) Recommendations on removing administrative constraints on businesses, improving international trade and tax administration; (-) Insufficient screening of regulations regarding their impact on innovation.

17	**Public Procurement**	(+)Four regulations which set new methods of carrying out the public procurement, approved by Governments (2013); (+)The Innovation Strategy (2013) provides the harmonisation of the national legislation with EU rules on public procurement.	(+)Orientation towards EU rules in public procurement should have repercussions on stimulation of innovation and R&D; (-)Public tenders do not include innovation criteria and new regulations did not remove this deficiency.
20	**Open Access**	(+)Activities of REM association – trainings, workshops and advocacy campaigns on OA; (+)Several universities approved institutional policy on OA or decisions to create institutional repositories (2012, 2013); (+)R&D data (projects, financing, HR, organisations, articles in national journals) were placed on Open data governmental portal and in the National Bibliometric Instrument (IBN), an scientific library for storage and measurement of scientific contributions of Moldovan researchers; (+)The strategy "Digital Moldova 2020" (2013) foresees a full digitalisation and availability of the scientific heritage.	(+)The REM actions have increased awareness of the OA importance in the Republic of Moldova; (+)Possibility to access the published results and other information on R&D increased due to IBN and Open data portal; (- Legal framework still does not provide a mechanism for ensuring open access to scientific and technological information resources; (-) Lack of progress in implementation of the principle OA for national funded projects.
21	**Knowledge Transfer**	(+)The Innovation Strategy (2013) provides the orientation of firms towards innovation and strengthening the connections between companies, educational and research sectors; (+)Strategy on SMEs (2012): priority "Increasing competitiveness and encouraging SME's innovativeness" comprises actions for the transfer of knowledge and IP protection; (+)National Intellectual Property Strategy (2012), contains 30 specific actions to encourage the creation, protection and use of IP; (+)The Concept of industrial clusters development (2013) contain provisions for encouraging technology transfer and development of branch research centres; (+)Development of networks of business incubators (5 new incubators in last 2 years), innovation incubators in universities (4 new incubators) and industrial parks; (-)Tax incentives for residents of S&T parks and innovation incubators have been removed from the fiscal code at the beginning of 2012.	(+) The provisions in strategies are in accordance with international practices; (+) Development of elements of the industrial and innovation infrastructure can facilitate knowledge transfer; (-) Measures envisaged in action plans less taken into account other forms of innovation than technological innovation (organisational, design, marketing etc.); (-) Cancellation of financial incentives for residents of S&T parks is not favourable for involvement of private sector in cooperation with R&D sector; (-) Still few universities have technology transfer offices and these KTO's do not yet manage actively IPR or operate, as would be understood in the context of EU countries; (-) A favourable legal environment for spin-offs from research and education institutions and for new start-up firms is still missing.
22	**European Knowledge Market for Patents and Licensing**	(+)Initiating negotiations of an Agreement of Cooperation between the Moldovan Government and EPO on Validation of European Patents in Moldova (late 2012); (+)Enhancing AGEPI's actions regarding the services for IP pre-diagnosis and technology audits, training courses on IPR issues, campaigns, exhibitions and other events for dissemination of information, prize awards etc.	(+) Strengthening the cooperation with EU institutions in the IP field; (+) AGEPIS's awareness campaigns contribute to better exploit existing knowledge and technologies; (-) A large share of granted patents still remains unused; the number of patents valid after 5 years is only 28% of the total valid patents.
23	**Safeguarding Intellectual Property Rights**	(+)The National Intellectual Property Strategy and its Action Plan (2012) provide a series of measures for Safeguarding Intellectual Property Rights (IPR); (+)Public consumer awareness campaign entitled "Stop Piracy and Counterfeiting" organised by the AGEPI (2012).	(+) Developed IP legislation and infrastructure; (-) The importance of IPR protection in most cases underestimated or ignored; (-) Lack of consolidated effective measures to prevent and combat piracy and counterfeiting, including wider use of unlicensed software.
24	**Structural Funds and Smart**	(+)Some elements of smart specialisation approach were used in the drafting of R&D and Innovation strategies;	(+) Developing a framework for regional development could facilitate smart growth by supporting regional

	Specialisation	(+)Development of a framework for regional development in the last years: strategies at national and regional level, the actions plans, structures and a financial instrument.	innovation activities; (-) The need to use smart specialisation approach for social and territorial cohesion is still poorly acknowledged; (-) Documents relating to R&I poorly take into account social, economic and territorial disparities; (-) Framework for regional development includes insufficiently innovation and smart specialisation aspects.
25	**Post 2013 Structural Fund Programmes**	(-)No actions have been identified	
26	**European Social Innovation pilot**	(+)The Innovation Strategy (2013) provides that the Government will give priority to innovative projects that will ensure maximum social benefits, including the diffusion of knowledge acquired / generated and provide solutions for the challenges of societal development;. (+)A series of activities of associations, foundations, cooperatives dealing with child care, social services, work integration of disabled people, rural community development, formal and no formal education etc. can be attributed to social innovation.	(+) The positive examples of social entrepreneurship development with the support of external funding; (-) Existing framework does not encourage enough the social innovation (e.g., concept of social entrepreneurship is not defined and enshrined in national legislation and it do not receive facilities); (-) Limited financial support and insufficient technical skills to develop and deliver social innovation.
27	**Public Sector Innovation**	(+)The Strategic Programme for Technological Modernisation of Governance (e-Transformation, 2011) and annual actions plans have two objectives: modernisation of public services and improving governance; (+)Initiatives launched by the Centre for Electronic Governance regarding e-services for citizens, e-services for business, e-Government services and infrastructure ("Paperless government", "Interoperability Framework", M-Cloud); (+)Action Plan for Open Government (2012) and the subsequent initiatives for increasing citizen participation in the decision making process and efficient management of public resources. (+) "Free Access to Government Public Data" initiative provide citizens and companies access to all public data – www.date.gov.md	(+) Transparency in the public sector increased significantly and the quality of public services has improved (reduced terms of supply, convenience, etc.) (+) Open government data allowed the development of innovative applications (e.g. http://socialtools.lungu.info/); (-) A weaker development of other types of public sector innovation than that concerns of adoption and diffusion of ICT and e-governance (e.g. workplace innovation); (-) Setting vague performance indicators, which do not allow a more detailed assessment of the degree of implementation of actions.
29	**European Innovation Partnerships**	(+)Participation of the Republic of Moldova in three initiatives of the European Innovation Partnership on Active and Healthy Ageing; (+)The R&D Strategy foresees that the national strategic directions will be synchronised with the six societal challenges indicated in Horizon-2020	(+) Supporting the innovation partnership by involving in the pilot EIP; (+) Aligning the national priorities with those of FP is favourable for increasing the involvement of Moldova in EIPs; (-) Lack of information about EIPs and lack of awareness of the necessity to participate in these partnerships
30	**Integrated Policies to Attract the Best Researchers**	(+)Measures for developing cooperation with the scientific diaspora, inclusively launching an online "Diaspora Network Platform"; (+)The launched national portal EURAXESS devoted a section "Incoming researchers" for foreign researchers, which contain information about entry conditions and work permits, taxes, daily life, working conditions, health and family.	(+)They managed in attracting scientific diaspora members short visits and participation in events; - Still undeveloped policies and reduced capacities to attract researchers from abroad because of low salaries and lack of infrastructure.

31	**Scientific Cooperation with Third Countries**	(+)Association to FP7 programme (2012) and enhancing the participation in European programmes; (+)Establishing of the Moldovan Office for Science and Technology (MOST) on Brussels; (+)New R&D bilateral programmes with EU countries (France, Germany, Italy and Romania) and CIS states (Ukraine, Belarus).	(+) Developing bilateral cooperation with third countries based on jointly funded programmes (+) Progresses in integration in ERA; (-) Broad definition of thematic priorities for international cooperation;
32	**Global Research Infrastructures**	(+)Financial contribution and participating in the major infrastructure Joint Institute for Nuclear Research in Dubna (Russia) where Moldova was one of the co-founders	(+) Maintaining access to infrastructure which can only be developed on a global scale; (-) Lack of coordination with other countries to participate in global RIs
33	**National Reform Programmes**	(+)The package of reforms in R&I approved by ASM (2013) provides important reforms; (+)New strategies approved or in progress approval (on innovation, research, education and intellectual property) also contain measures for reforming R&I field.	(+)Elements of the reform of the R&I system in approved documents; (-) Moldova does not have a national Reform Programme within the meaning of European documents; (-) Reform proposals from different documents are not correlated with each other and many are not reported to the European objectives

Annex 3. National Progress towards realisation of ERA

ERA Priority	ERA Action code	ERA Action	Recent changes	Assessment of progress in delivering ERA
1. More effective national research systems	**MS01**	Action 1: Introduce or enhance competitive funding through calls for proposals and institutional assessments	(+)Establishing of new agency (CFCFA) in order to improve the public R&D funding (2012); (+)Implementation of a new procedure for evaluation R&D entities and their ranking (2011-13)	(-) Share of competitive funding has been reduced; (-)The evaluation and ranking of R&D entities is not linked with the distribution of institutional funding
	MS02	Action 2: Ensure that all public bodies responsible for allocating research funds apply the core principles of international peer review	(+)New regulation for organisation expertise in R&D (2012) (-)Reorganisation of evaluation body CCE (2012)	(+)More clear procedures for the evaluation process; (-)The objectivity and avoiding conflicts of interest is not met
2. Optimal transnational co-operation and competition	**MS06**	Action 1: Step up efforts to implement joint research agendas addressing grand challenges, sharing information about activities in agreed priority areas, ensuring that adequate national funding is committed and strategically aligned at European level in these areas	(+)Joint bilateral funding programmes (2012-2013) (+)Participation in European networking projects for region (+)Participation within Joint Programming Initiatives	(+)Association to EU framework programme stimulate actions for jointly addressing grand challenges; (-)Limited national funding for transnationally coordinated R&D
	MS07	Action 2: Ensure mutual recognition of evaluations that conform to international peer-review standards as a basis for national funding decisions	(+)Regional cooperation initiative on R&D evaluation of EECA countries (2012)	(-)Lack of practical actions
	MS08	Action 3: Remove legal and other barriers to the cross-border interoperability of national programmes to permit joint financing of actions including cooperation with non-EU countries where relevant	(+)Amendments to national regulations relating salaries and other aspects of participation in FP7 (according to FP7 Guide on Financial Issues) (2012)	(+)Framework is permissive to financing joint programmes (-)National funding programmes are not open to foreign R&D entities
	MS15	Action 4: Confirm financial commitments for the construction and operation of ESFRI, global, national and regional RIs of pan-European interest, particularly when developing national roadmaps and the next SF programmes	(+)Participation in European e-infrastructure for research (GEANT, SEE-GRID, SEERA-EI etc.)	(-)No explicit policy and financial commitments concerning ESFRI Schemes (-)Lack of national RIs roadmap

	MS16	Action 5: Remove legal and other barriers to cross-border access to RIs	-	(+)National RIs are open to foreign researchers (-)Lack of important national infrastructure
3. An open labour market for researchers	**MS24**	Action 1: Remove legal and other barriers to the application of open, transparent and merit based recruitment of researchers	-	(-) No progress in recruitment procedures; recruitment is not always open, transparent and merit based
	MS25	Action 2: Remove legal and other barriers which hamper cross-border access to and portability of national grants	-	(-)National grants still remains non portable
	MS26	Action 3: Support implementation of the Declaration of Commitment to provide coordinated personalised information and services to researchers through the pan-European EURAXESS3 network	(+)National portal EURAXESS Moldova was opened (2013)	(+) National portal includes Services, Rights and Links (-) Vacancies of the national R&D organisations are still not announced on the portal
	MS27	Action 4: Support the setting up and running of structured innovative doctoral training programmes applying the Principles for Innovative Doctoral Training.	(+)Provisions in draft documents stipulates that the doctorate will be the 3rd cycle of HE and it will be organised in doctoral schools	(-)Doctoral training is still implementing in a traditional way
	MS28	Action 5: Create an enabling framework for the implementation of the HR Strategy for Researchers incorporating the Charter & Code	(+)Joining of the national scientific community to the European Charter for Research and the Code of Conduct for Recruitment of Researchers (ASM decision, 2011)	(+) The ASM decision was followed by four institutions (-) No internal analysis in R&D institutions in order to compare their institutional practice against Charter & Code principles (no Moldovan institution is yet among the HRS4R Acknowledged Institutions)
4. Gender equality and gender mainstreaming in research	**MS39**	Action 1: Create a legal and policy environment and provide incentives	(+)Law on ensuring equality (2012)	(+)Legal framework stipulates gender equality (-) No special provisions on gender equality in R&D
	MS40	Action 2: Engage in partnerships with funding agencies, research organisations and universities to foster cultural and institutional change on gender	-	(-)No charters, action plans, and specific boards or other bodies for gender policy in R&D have been set up so far
	MS41	Action 3: Ensure that at least 40% of the under-represented sex participate in committees involved in	-	(-)Women are significantly under-represented in decision making committees and bodies responsible for

		recruitment/career progression and in establishing and evaluating		evaluations
5. Optimal circulation, access to and transfer of scientific knowledge including via digital ERA	**MS45**	Action 1: Define and coordinate their policies on access to and preservation of scientific information	(+)Institutional policy on OA was approved by several universities (2012-2013) (+)National campaign "OA Moldova" (2013)	(+)Active promotion of OA by the association REM (-)Lack of mechanisms to ensure OA to R&D information resources
	MS46	Action 2: Ensure that public research contributes to Open Innovation and foster knowledge transfer between public and private sectors through national knowledge transfer strategies	(+)Provisions for enhancing transfer of scientific knowledge in Innovation Strategy (2013) (see also Annex 2, 21)	(-)The impact of existing measures is limited due to imperfect mechanisms and the modest budget
	MS47	Action 3: Harmonise access and usage policies for research and education-related public e-infrastructures and for associated digital research services enabling consortia of different types of public and private partners	(+)Decisions to create institutional repositories in several institutions (+)Development of the IBN and Open data governmental portal (+)Launching public-private M-Cloud Platform (2013)	(+)Increased access and usage of e-Infrastructure (-)Insufficient policy support for development of digital research services
	MS48	Action 4: Adopt and implement national strategies for electronic identity for researchers giving them transnational access to digital research services	-	(-)No entity from Moldova is yet involved in the work of REFEDS

REFERENCES

Bouton, L., Saumik, P., Tiongson, E. (2011): The impact of emigration on source country wages: evidence from the Republic of Moldova. Policy Research Working Paper Series 5764, The World Bank, *http://elibrary.worldbank.org/content/workingpaper/10.1596/1813-9450-5764*

BNS (2013a): National Bureau of Statistics. Gross Domestic Product in the Republic of Moldova in January-June 2013, *http://www.statistica.md/newsview.php?l=en&id=4198&idc=168*

BNS (2013b): National Bureau of Statistics. Research and development activity in 2012, *http://www.statistica.md/newsview.php?l=en&id=4052&idc=168*

BNS (2013c): National Bureau of Statistics. Activity of higher education institutions in 2013/14 academic year, *http://www.statistica.md/newsview.php?l=ro&idc=168&id=4257*

CA (2011): The Court of Accounts. The performance audit report „To achieve the expected benefits, it is necessary to improve the policies and the procedures of the Academy of Sciences of Moldova for allocating and monitoring research funds", *http://www.ccrm.md/file/hotariri/2011/Eng/H19_2011_%20ASM%20eng..pdf*

Ciurea et al. (2012): Ciurea, C., Berbeca V., Lipsean, S., and Gurin, M. Higher education system in the Republic of Moldova in the context of the Bologna Process: 2005-2011. Chisinau, Soros Foundation, *http://soros.md/en/publication/2012-02-24*

CNAA (2013): National Council for Accreditation and Attestation. Statistics on accreditation and attestation, *http://www.cnaa.md/en/*

Cuciureanu, G. (2011): Management of the national research and development system: between globalisation and provincialisation. Chisinau, ProEdit.

EC (2013): European Commission. Implementation of the European Neighbourhood Policy in Republic of Moldova. Progress in 2012 and recommendations for action. Brussels, 20.3.2013, SWD 80 final, *http://ec.europa.eu/world/enp/docs/2013_enp_pack/2013_progress_report_moldova_en.pdf*

EG (2011): Expert Grup. Popa A. and Prohnitchi V. The R&D Sector in Moldova: is a Reform Necessary or Not? *http://expert-grup.org/en/biblioteca/itemlist/category/107?lang=en*

EP (2013): European Parliament resolution of 12 September 2013 on the pressure exerted by Russia on Eastern Partnership countries, P7_TA(2013)0383, *http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN&reference=P7-TA-2013-383).*

ERAWATCH (2013): ERAWATCH Country Report 2012: Republic of Moldova, *http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/reports/countries/md/report_0004?tab=reports&country=md*

EUROSTAT (2013): Education and training statistics, *http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes, [educ_grad4], [educ_enrl5]*

IBRD/WB (2013): International Bank for Reconstruction and Development / The World Bank. Doing Business 2014. Understanding Regulations for Small and Medium-Size Enterprises, *http://www.doingbusiness.org/~/media/GIAWB/Doing%20Business/Documents/Annual-Reports/English/DB14-Full-Report.pdf*

MG (2011): Moldovan Government. The Government Program „European Integration: Freedom, Democracy, Welfare", *http://gov.md/lib.php?l=en&idc=445*

OECD (2011): OECD. Competitiveness and Private Sector Development, Republic of Moldova 2011: Fostering SME Development, Competitiveness and Private Sector Development, OECD Publishing, p. 126

Popa A. (2011): Research, Development and Innovation in the Republic of Moldova. Expert Grup, http://expert-grup.org/en/biblioteca/itemlist/category/107?lang=en

Popa A. (2012): Draft Strategy for the Development of Research and Innovation until 2020: reform or deadlock? Expert-grup, Economic Commentary, no. 142, November 2012, http://expert-grup.org/en/activitate/comentarii

NIP Strategy (2012): National Intellectual Property Strategy until 2020, Government decision #880 of 22.11.2012, http://lex.justice.md/index.php?action=view&view=doc&lang=1&id=345660

PRO INNO Europe (2011): Mini Trend-Chart Country Report / Republic of Moldova http://ec.europa.eu/enterprise/policies/innovation/files/countryreports/moldova_en.pdf

SCSTD (2013): Supreme Council for Science and Technological Development. Report on the work of the Supreme Council for Science and Technological Development and the main scientific results obtained in science and innovation in the 2012, Chisinau, http://asm.md/administrator/fisiere/rapoarte/f170.pdf

SCSTD (2011): Supreme Council for Science and Technological Development. Report on the work of the Supreme Council for Science and Technological Development and the main scientific results obtained in science and innovation in the period 2006-2010, Chisinau. http://asm.md/administrator/fisiere/rapoarte/f168.pdf

SJR (2013): SCImago Journal&Country Rank, http://www.scimagojr.com/countryrank.php

Stuart et al. (2010): Stuart, E., Fano, E., Scales, L. et al. Intellectual property law and policy. Law approximation to EU standards in the Republic of Moldova, 2010, http://www.ncu.moldova.md/public/files/publication/armonizare/SLAG_IP_ENG.pdf

Stuart&Dalby (2010): Stuart, E., Dalby, J. Public procurement law and policy. Law approximation to EU standards in the Republic of Moldova, 2010, http://www.ncu.moldova.md/public/files/publication/armonizare/SLAG_PP_ENG.pdf

Technopolis (2010): Technopolis group. Study on the organisation of doctoral programmes in EU neighbouring countries: Moldova, December 2010, http://ec.europa.eu/education/external-relation-programmes/doc/doctoral/moldova_en.pdf

TI (2013): Transparency International. Corruption Perceptions Index, http://cpi.transparency.org/cpi2013/results/

Turcan N. Scientific communication in the context of open access to information. Chişinău: CEP USM, 2012. 324 p.

UIS (2013): UNESCO Institute of Statistics, http://stats.uis.unesco.org/unesco/TableViewer/document.aspx?ReportId=143&IF_Language=eng

UNESCO (2010): UNESCOScience Report 2010. The Current Status of Science around the World. UNESCO Publishing, http://www.uis.unesco.org/Library/Documents/UNNESCOSR10-eng.pdf

WB (2013a): World Bank. Moldova, http://www.worldbank.org/en/country/moldova

WB (2013b): World Bank. Moldova – Country partnership strategy for the period FY14-17. Washington DC, http://documents.worldbank.org/curated/en/2013/08/18114315/moldova-country-partnership-strategy-period-fy14-17

WEF (2013). World Economic Forum. Global Competitiveness Report 2013-2014, http://reports.weforum.org/the-global-competitiveness-report-2013-2014/

WIPO (2013): World Intellectual Property Organisation. Statistics on Patents, http://www.wipo.int/ipstats/en/

LIST OF ABBREVIATIONS

AGEPI	State Agency on Intellectual Property of the Republic of Moldova
AITT	Agency for Innovation and Technology Transfer
ASM	Academy of Sciences of Moldova
BERD	Business Expenditure for R&D
BES	Business enterprise sector
BNS	National Bureau of Statistics
CCE	Consultative Council for Expertise
Charter & Code	European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers
CIP	Centre for International Projects
CFCFA	Centre for Fundamental and Applied Research Funding
CIS	Commonwealth of Independent States
COST	European Cooperation in Science and Technology
CNAA	National Council for Accreditation and Attestation
DCFTA	Deep and Comprehensive Free Trade Area
EEC	Eastern European countries
EIP	European Innovation Partnership
ERA	European Research Area
ESFRI	European Strategy Forum on Research Infrastructures
EU	European Union
FDI	Foreign Direct Investment
FP	Framework Programme for Research of the EU
FP7	Seventh Framework Programme
GBAORD	Government Budget Appropriations or Outlays on R&D
GDP	Gross Domestic Product
GERD	Gross Domestic Expenditure on R&D
HEIs	Higher Education Institutions
HES	Higher Education Sector
ICT	Information and communication technologies
IncoNet EECA	S&T International Cooperation Network for Eastern European and Central Asian Countries
ITTPs	Innovation and technology transfer projects
IU	Innovation Union
IUCR	Innovation Union Competitiveness Report
JINR	Joint Institute for Nuclear Research in Dubna (Russia)
OA	Open Access
ODIMM	Organization for Small and Medium Enterprises Sector Development
OECD	Organisation for Economic Cooperation and Development
PROs	Public research organisations
R&D	Research and development
R&I	Research and innovation
REM	Association Electronic Resources for Moldova
RI	Research infrastructure
SCSTD	Supreme Council for Science and Technological Development
SMEs	Small and medium sized enterprises
S&T	Science and Technology
UNDP	United Nation Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation

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